May 1939

RADIO AND HOBBIES IN AUSTRALIA

VOL. 1 No. 2

In this issue

A "WIRELESS WEEKLY" PUBLICATION

Sensational Success

BRIMAR 1·4 volt SERIES BATTERY VALVES

SPECIALLY DESIGNED TO OPERATE ECONOMICALLY FROM A SINGLE DRY CELL.

1A5G. PENTODE POWER AMPLIFIER Designed for service in the output stage of radio receivers operating from a low voltage battery filament supply.

1C5G. PENTODE POWER AMPLIFIER Designed for service in the output stage of radio receivers operating from a low voltage filament supply.

1A7G. HEPTODE PENTAGRID CONVERTER Designed for service as a combined mixer and oscillator in radio receivers operating from a low voltage battery filament supply.

1H5G. A DIODE-TRIODE DETECTOR AMPLIFIER Designed for service as a combined diode detector and amplifier in Radio receivers operating from low voltage Battery filament supply.

1N5G. PENTODE AMPLIFIER Designed for service as a high frequency amplifier in radio receivers operating from a low voltage Battery filament supply.

BRIMAR VALVES

STOCKS ARE NOW AVAILABLE! FOR TECHNICAL DATA ADDRESS ENQUIRIES TO ANY OF THE BRIMAR DISTRIBUTORS LISTED BELOW:

N.S.W.: Standard Telephones & Cables Pty. Ltd., 258-274 Botany Road, Alexandria. QUEENSLAND: Trackson Bros. Pty. Ltd., 157-9 Elizabeth Street, Brisbane. SOUTH AUSTRALIA: D. Harris & Co., 138-140 Rundle Street, Adelaide. WESTERN AUSTRALIA: M. J. Bateman Ltd., 12 Milligan Street, Perth. VICTORIA: Noyes Bros. (Melb.) Pty. Ltd., 597-603 Lonsdale Street, Melbourne. TASMANIA: W. & G. Genders Pty. Ltd., 69 Liverpool St., Hobart; 53 Cameron Street, Launceston; also at Burnie. NEW ZEALAND: Standard Telephones & Cables Pty. Ltd., P.O. Box 638, Wellington; P.O. Box 1897, Auckland; P.O. Box 983, Christchurch.

M960

With the Editors

OUR FIRST ISSUE

THE reception afforded the first issue of "Radio and Hobbies" exceeded our fondest expectations. We knew that we could expect support from the hundreds of readers who have followed the technical section of "Wireless Weekly" but we had no idea that they numbered so many.

We printed a large number of copies, enough to fulfill likely requirements according to our estimates, but within seven days the machines were running on a re-print order nearly as big as the original. Even so, a large number have been unable to obtain copies, especially in other States where we did not expect to find anything like such keen support.

To those who were unable to obtain copies we can only suggest that supplies of future issues are assured by the placing of an annual subscription.

OUR SECOND ISSUE

IN presenting our second issue we want to draw your attention to the size of the issue, 80 pages, plus the cover. This is eight pages larger than the first issue, and we would have made the issue still larger if our presses had been capable of handling a greater number of pages than this. The increase is our reply to the many comments, "The first issue is grand, but can you keep it up?" Of course we can keep it up, and you'll find the quality of the articles right up to standard, too.

You'll find many new things in this May issue. We particularly commend to your notice the Technical Editor's World Review, which covers a number of interesting items culled from overseas magazines of various types. Mr. Anderson's article on television comes at an opportune time as America is just launching its first commercial television. Articles on the construction of radio equipment have been maintained, and the circuits featured should have considerable appeal to amateur set builders.

The Hobby Section has been strengthened but we have adhered to our policy of avoiding hobbies which cannot be classified as having appeal to those interested in "things to make."

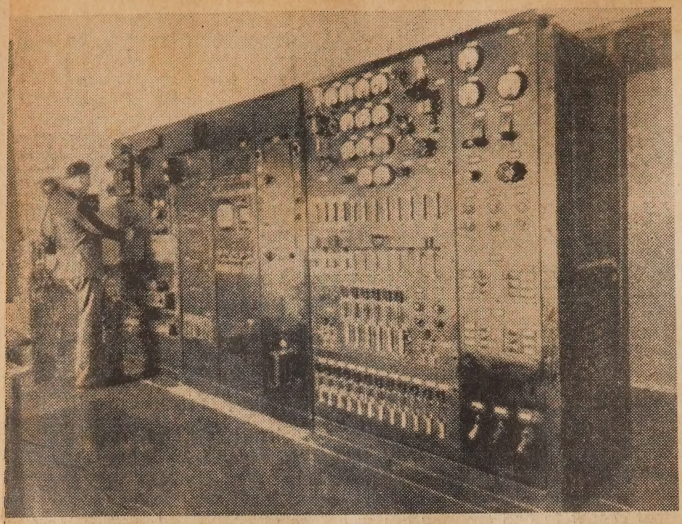
In closing, we must pay tribute to the hundreds of readers who have sent congratulations and suggestions for further improvement.

The Easter holidays and general pressure of work have made it impossible for us to carry out all the suggestions made but they will receive adequate consideration in the immediate future. We have great plans for the future of "Radio and Hobbies."

EDITOR:
A. G. HULL

TECHNICAL
EDITOR:
JOHN MOYLE

PUBLISHED BY WIRELESS NEWSPAPERS, PTY., LTD., 60-66 ELIZABETH STREET, SYDNEY.



Here is the control panel of the transmitter located in the Empire State building, where experimental television has been housed for three years.

LET US

U.S.A. BROADCASTING THIS MONTH

The commencement of Television services on a regular footing in U.S.A. this month, is a big thing for America. This article, written by a man who has made a special study of television today, is, therefore, well-timed to present a survey of television matters not only in America, but also in other countries.

"Can you give me a description of television?"

THIS question was fired at me recently, so I turned to the explanation given out by the B.B.C. Here it is, a perfect word picture:—

"Excited by impulses borne on a carrier wave which vibrates 45,000,000 times a second, a spot of light 1/32 of an inch in diameter, travelling at the rate of 6000 miles an hour, and varying in its illumination up to 4,000,000 a second, traces, 25 times a second, interlaced lines, a page of 405 lines on the sensitised end of a cathode ray tube. The vision and sound signals are synchronised to within one four-millionth part of a second."

Unable to wander any further in these realms of fantastic figurings, let me content myself with putting down in simple language what Television has done and is doing in other parts of the world.

LET US LOOK AT AMERICA

We are apt to think that Television has been non-existent there—that nothing will be done until the official opening of Television to synchronise with the inauguration of the World's Fair in New York.

This is far from the truth.

The R.C.A. (in collaboration with the N.B.C.) has been carrying on extensive tests and experimental transmissions for several years. Back in 1936 programmes were sent out from the Empire State Building, and a more or less constant service has been maintained, interrupted for structural and technical alterations from time to time.

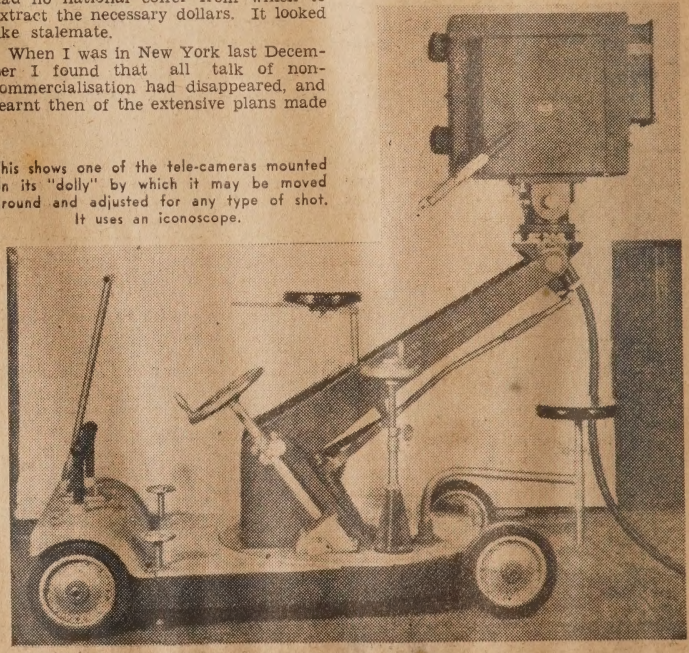
When the Federal Communications Committee announced, in 1935, that the Federal authorities would not permit the commercialising of Television, I thought, in common with others, that this would mean the putting back of activities for many years.

The B.B.C. owes its early start with regular public transmissions in 1936 to the fact that it had a national revenue from which to draw the moneys necessary to start Television—the licence fees, etc., provide the best part of five million a year, and with the first flush of Television it seemed a wise move to allocate portion of this to the inauguration of a Television service in London.

America, not paying a licence fee, had no national coffer from which to extract the necessary dollars. It looked like stalemate.

When I was in New York last December I found that all talk of non-commercialisation had disappeared, and learnt then of the extensive plans made for its introduction, in April, with necessary sponsorship.

The R.C.A. and the N.B.C. have not been wasting time. Without regular services, it was not expected that receivers would be sold in any number, although desultory sales have been made, and receivers can be seen in various stores at prices relatively higher than in London—a small 5 by 4 image at £40, against a little more than half that in London.



This shows one of the tele-cameras mounted on its "dolly" by which it may be moved around and adjusted for any type of shot. It uses an iconoscope.

LOOK AT TELEVISION

ENGLAND— GERMANY— LEAD THE MARCH

David Sarnoff, President of the R.C.A., opens the 1939 New York Television Programmes. Ailmost immediately, these programmes will be working to a definite schedule.

SETTING THE STAGE

For many months now the public has seen actual Television. Thousands daily are conducted through the spacious studios of the R.C.A. in the magnificent building in Rockefeller Centre—and they have posed for the camera—stood "unmade" under fierce arcs, and, unabashed. have smiled and wisecracked their way through impromptu interviews, while their friends and other members of the party smile and smirk in sympathy with their images in the adjoining rooms.

These Television fans are ushered in 50 at a time—a new batch every ten minutes. It costs 85 cents to go over the whole shooting-box, including the view from the 70th story of the R.C.A. building—and in this way countless thousands have seen and taken part in Television. They are selling it in advance.

THE LINE UP

Ready for the big push over in April, we find the R.C.A. and N.B.C. allied to huge picture interests, and with the radio manufacturers well in with them, there will be tremendous publicity, sales force, and imagination joined together to send Television on its way.

Hence the friendly challenge thrown out by the N.B.C., and now accepted by the B.B.C., "that New Yorkers will buy more Television receivers this year than will Londoners." Fancy the dignified B.B.C. accepting the challenge! But they did in the right spirit, and the losers shout the winners a huge dinner, to take place in the city of the winning team, the whole function to be televised.

In two years New York will be ahead of London, for behind its efforts will be the enormous influence of sponsored programmes and the other forces I have set out. For Television will be meat and drink to advertisers.

So, from the topmost part of the Empire State Building will go winging the images of Television—1350 feet up and many miles out. Already freak reception of B.B.C. Television is reported in New York. How long before these will be reciprocal?

THE COLUMBIA SYSTEM

Close on the heels of the N.B.C. will come the Columbia Broadcasting System, lagging behind—purposely. Not allied to radio manufacture, it, as a programme company, has made little or no adventure into Television beyond experimental incursions, but promises regular programmes in May or June of this year. It will operate from the top of the ornamental tower decorating the top of the Chrysler Building in New York.

LIST OF TELEVISION TRANSMITTERS

American Television will be 441 lines, with 60 frames per second, and U.S.A. is destined to have many powerful transmitters dotted throughout the country. Just scan the list of licences already granted:—

R.C.A., from New York (three licences).
CBS, from New York.
Philco Company from Philadelphia.
Don Lee Company—Los Angeles.
Radio Pictures—Long Island.
General Television Co.—Boston.
Zenith Radio Company—Chicago.
Iowa University—Iowa.
National Broadcasting Co.—New York.
Farnsworth Television Co.—Philadelphia.
Du Mont Laboratories—New Jersey.
Kansas State College from Kansas and others.

Power ranges from 50 watts to 30,000 watts and frequencies from 20,000 k. to 400,000 k.c. The highest yet allocated is allotted to Philco, namely 204,000 k.c.

COST OF A TRANSMITTER

Already the R.C.A. is offering and selling experimental transmitters with a power of 1000 watts and a radius of about ten miles, for 60,000 dollars complete and erected.

BRITISH INVASION

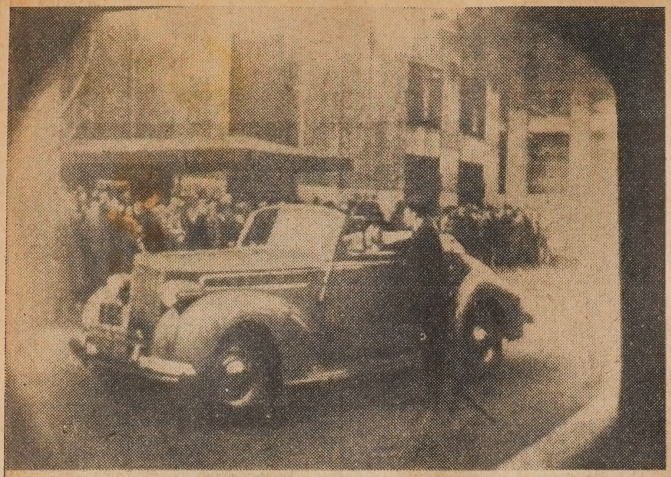
And now that the experimental phase is over and real development is at hand the whole thing takes on a larger scope. The public change from spectators to participants, and radio and film men and all the complex creative machinery and technical perfection now swing behind this latest force.

And the film world, ready to play its part, is caught napping, for there is no satisfactory method of film screen projection, and rumor hath it that "Scophony," the British method of screen projection (mechanically operated) will be the method used in New York, and Solomon Sagall, of the Scophony Company, is at present in New York to float, it is said, a ten million dollar company to exploit the system there. And if Solomon is there, John Logie Baird will not be far behind, for these two

(Continued on Next Page)

By . . .

OSWALD ANDERSON



An actual photograph of the television image on the end of a cathode ray tube, giving an excellent impression of how television will appear when it comes to Australia.

n head systems that are keenly rival-
ic. Now Television really marches on.

EVELOPMENTS IN ENGLAND

Television as we know is entirely in
e hands of the B.B.C. There are no
tside interests, and no commercialisa-
n. A regular service has been in
eration since November, 1936, averag-
g over 20 hours a week, emanating
om the transmitter at Alexandra
lace (lovingly called Ally Pally), about
h miles from London proper.
Seven studios are being built, the
rial system is complicated, but very
fective, its height 350 feet above sea-
vel. Definition, 405 lines with 50 frames;
e power used, 17 kilowatts, to be
creased to 30 k.w. later this year; the
equencies are 6.7 and 7.2.

OW FAR CAN ONE SEE ?

With true British caution, the dis-
nce promised at first was 25 miles.
en reception at 30 and 40 miles was
ported. Even conservative engineers
the B.B.C. admit to 50 miles, and
thusiastic viewers swear from 60 to
miles, and there are many authen-
cated cases of reception and good
finition at 100 miles.
When the power goes up and the
rials are still further improved, the
dius will be extended to 100 miles from
ndon, bringing 20 million people
thin seeing distance.
Then, with repeating stations operat-
g at Birmingham, Leeds, Manchester,
c., and co-axial cables run through the
untry, the people "up north" will be
ven the advantages at present
stricted to their brethren "down
uth."

OW MANY SETS ARE SELLING?

Let me ask you, "How many sets do
u think will be sold?" How many
ople will want a receiver when they
n see the things they want on a gadget
at looks like a radio and costs little
ore to buy, and no more trouble to
ork—when by paying a few pounds
ore when they change their old radio set—when by forking out 4/- a week instead of 2/-, they can bring to THEIR home the "coop final," the boat race, the Derby, boxing, wrestling, swimming, tennis matches, processions, the King opening this, the Queen that—

And a million people change their sets for new ones each year. So I ask you, "How many people will be content

"NOT TO HAVE TELEVISION ?"

What About Germany ?

Experimental transmissions have been going on for years mainly from Berlin, where the transmitter works from Amerika-Haus. The power used is 16 kilowatts and the definition, 441 lines and 50 frames.

Other transmitters are planned for Central and West Germany. Receivers are not on general sale, but "looking in" places are provided for the public, and programmes tend to propaganda and Hitlerisings. Screens are being tried out in theatres, but development is slow. On the other hand, Telephone-Television is in operation and you can phone your friend in Berlin and talk and see for about ten shillings (our money) for a three-minutes conversation. These facilities will be extended to Leipzig and Nuremburg later.

But German engineers, in common with others are not sitting down. Did you know that the engineers from 17 countries met in London last December to plan Television ahead, so that programmes will be exchanged between countries as at present? This means the laying of cables, etc., and is not likely to happen for a few years. It's a sort of "We will give you a programme showing the annexation of Iceland if you will give us one in return showing Chamberlain looking annoyed." But, seriously, the plan is this: Programmes will be swapped between countries at no charge, but each country shares the mechanical cost of lines, etc. They are certainly planning well ahead.

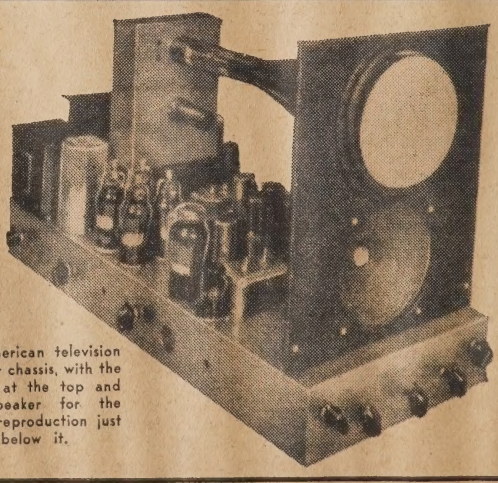
And France ?

From the Eiffel Tower transmissions have been going out for some time, and as many as three hours a day have been attempted. The power used is very high—25 k.w.—and reports have been received of reception at Brighton, 180 miles away. Receivers are not on sale, and until the man in the street can buy his own televisor the interest must remain dulled.

TELEVISION VERSUS FILM

The big spotlight of publicity was focused on Television with the Boob-Danaher fight. At this time, February last, the sale of sets had increased to 500 weekly, and the manufacturers were hard pressed to keep up with orders. Selfridge was running a huge exhibition with 8000 a day viewing television from 50 receivers. Prices of sets ranged from 21 guineas upwards.

Boon—a coming world champion—was to fight Danaher at Harringay, and the National Sporting Club asked the B.B.C.



An American television receiver chassis, with the screen at the top and the speaker for the sound reproduction just below it.

Above: One of the new television vans recently completed by the N.B.C. in America.
Right: An inside view of the van.

to televise it. They agreed, and offered £75, in the best B.B.C. take it or leave it manner. The N.S.C. said, "Go jump in the Serpentine," or words to that effect. But a compromise was reached, which will have a far-reaching effect on future developments. Said the B.B.C.: "We will televise the fight and pay you nothing—but (and mind you, this is not to be taken as a precedent) you may sell the fight to film promoters."

Then the fun began.

The Gaumont British, in with Baird Big Screen Television, bought rights for £750, and the other circuit, in with Scophony Screen Television, secured rights for their theatres. Time was short, but four theatres were equipped with 15 by 12 inch screens.

You read the cables—The Harringay Stadium was packed—the four theatres were jammed—the police turned away thousands fighting to get into the theatres—the crowds stood up in their seats and cheered the fighters—or, at least, their images—sets sold three times in quantity—manufacturers worked top pressure!

Do you think this a nine days' wonder?

How will it affect the theatre, the cinema? Here opinions differ. Let me quote Campbell Dixon, an Australian, whose film reviews in the London "Daily Telegraph" are outstanding. Dixon says:

"How will all this affect the cinema and the theatre? There seem to be two schools of thought—those who despair for the older entertainments, and those who recall that the same dismal prophecies of ruin were made when the talkies arrived.

"The pessimists ask why anybody should go out into the cold and rain when they can sit by the fire and turn a switch.

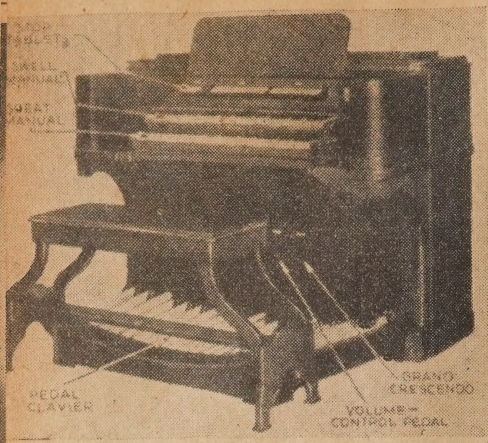
"The optimists reply that there are many men and women who experience no difficulty in tearing themselves away from the domestic hearth, even on the coldest nights. When it comes to entertainment most people are gregarious; if they cannot observe a crowd enjoying the same show they are not quite sure that they are enjoying themselves at all. And young people will probably always want to escape from home, if only because they would be embarrassed by family observers of the ritual holding of hands, but have no objection to a little necking before a thousand strangers."

"Which school is right? Your guess is as good as mine. I only know that when the political problems have been settled, and science has perfected its latest miracle, and showmanship has been carried to new heights, we shall end with one more delightful medium for observing the crooked sheriff's fall, the sad plight of the princess who falls in love with her crooning music master from Milwaukee (Wis.), and the apotheosis of the five-and-ten-cent girl who marries the boss's son to a murmured exchange of 'Happy? . . . So happy!'

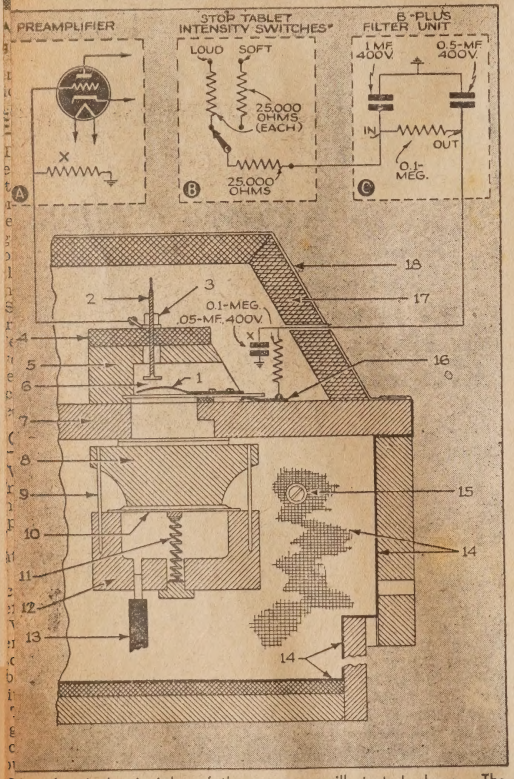
What do you think of this angle, and what do you really think of Television and its possibilities in Australia?

With your permission, Mr. Editor, I would like to ask your readers to write to you, or to me care of your excellent paper, and let us discuss this interesting matter from various points of view.

How little behind the rest of the world are we in so many things that mean progress! A new car—the latest aeroplane—an efficient printing machine—new office machine—radio technique—host of things! They come to us quickly—we need them. We ask for them, and we are prepared to pay for them.



The console of the electric organ, which is known at the "Everett." It measures 57 x 47 x 44 inches high.



The electrical principles of the organ are illustrated above. The organist releases blasts of air that vibrate regular brass organ reeds to generate voltages in condenser-type pick-ups.

1. Reed.
2. Adjustable tone screw.
3. Tone-screw lock-nut.
4. Tone-screw insulating strip.
5. Cell board.
6. Reed cell.
7. Pallet board.
8. Pallet.
9. Pallet Guide Pin.
10. Pallet Pouch.
11. Pallet Spring.
12. Pallet Rail.
13. Key action tube.
14. Screen Shielding.
15. Ground Post.
16. B plus strip.
17. Muffling Felt.
18. Shield Cover.

TECHNICAL

THE PIPE-LESS ORGAN

ELECTRIC organs, using oscillating valves to generate the fundamental tones, which are mixed together to provide more complicated wave-forms, are not new. Such organs have been in use for some years now.

Here is a new type of electric organ described in "Radio-Craft" for March. The instrument is comprised of two manuals and pedal clavier, built in strict conformity to the standards adopted by the American Guild of Organists.

Brass vibrators or reeds are used in the organ to generate the tones, which, because of their similarity to those of a wind-organ, have the same quality because of this origin.

The pitch, power, and timbre of the notes will depend on the length, thickness, and scale of tongue. The length of the tongue is practically constant for any given pitch, varying from about 3¼ inches to less than ½-inch, and in width from ¼-inch down to 1/16th. The scale (width in proportion to length) varies considerably according to characteristic tones. A wide scale gives a full, round tone, and a narrow scale a more brilliant, strident tone.

HOW IT WORKS

The diagram shows the works. The reeds are set in motion as the keys are depressed by an air blast. This is the fundamental difference from the type which uses oscillating valves as generators. The tone is set by the characteristics of the reed, and not by mixing fundamentals in harmonic relationship.

It is not desired to hear the sound produced by the reeds themselves, as these would interfere with the sound coming from the speaker system. Therefore the reeds are housed in muffling chambers, which prevent them being heard.

When the stop tablet on the console is depressed, the pallet beneath the vibrator opens, and a current of air produced by the suction unit is forced against the free end of the vibrator tongue, which is immediately set into vibration. It will continue to vibrate as long as the stop remains depressed. The suction motor is in the console.

The vibrators for the different tonalities are connected in parallel to adjustable polarising voltages. When set into motion, they constitute one plate of a condenser microphone or pick-up. The electrostatic tone screws mounted above the reeds are also connected in parallel, and lead to the input channels of a pre-amplifier.

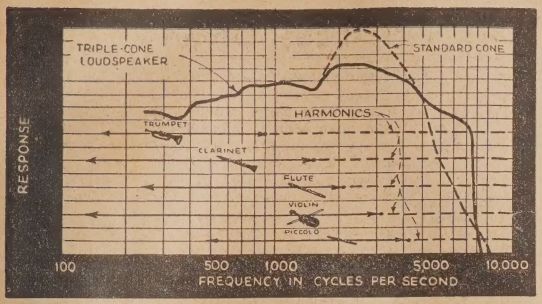
The reeds and the tone screws are not allowed to touch at any time. The electrostatic charge between them, caused by the applied polarising voltage, is varied by the reed movement, and thus the voltage on the pre-amplifier valve's grid is also varied.

The tone screws are placed over a predetermined part of the vibrators, according to the extent of dissonant harmonic elimination desired. Amplitude or tone regulation is varied by raising or lowering the tone screws, which vary the output. Differently shaped and voiced vibrators, different design of the air chambers, mountings, and metals used, all have their effect on the tone produced by each reed assembly.

The pre-amplifier is, of course, fed to a larger power amplifier, which operates a combination of loudspeakers in the speaker console. The whole set-up has something in common with such things as electric guitars, &c., except that the pick-up device, instead of being magnetic, operates on exactly the same principle as high-quality condenser microphones.

The great advantage claimed is that the tone of each stop does not depend on the mixing of fundamentals by the organist. It is set initially by the characteristics of the vibrating reed, and the electrical output from the speakers, therefore, is a reasonably exact duplication of this tone, depending very largely, of course, on the quality of the amplifier and the loud speakers. A closer duplication of wind organ quality is therefore obtainable.

EDITOR'S WORLD REVIEW



This graph shows the comparative curves of the new Triple-cone speaker as compared with that of a standard single-cone type. Note the elimination of the peak at 3000 cycles which is characteristic of the standard speakers, and the extra high-note response over 8000 cycles.

Developments in other lands

Articles reprinted or re-written from the world's technical journals, to give you in a few pages, the story of progress for the month.

New Speaker Has Three Cones

A NEW type of loudspeaker which has three cones, each with a definite work to do, is described in "Radio-Craft" for March.

The problem of producing a wide-range loudspeaker as a single unit is one which has occupied sound-engineers for many years. Many different ways of tackling the problem have been put forward in theory and practice, with varying results.

This new speaker attacks the problem in a new and interesting way. Instead of depending on a single cone, there are actually three, mounted on the one assembly, and driven from the same voice coil.

The usual manner of providing for good high and low note response is, in general, to design the dimensions and suspension of the cone so that the bass register can be produced as well as possible, and then to design the cone, its thickness at various points, and its material, so that the high frequencies are preserved. This is difficult because the conditions prevailing for a good low note speaker are not the same as those required for a good high-note speaker.

The cone of the new design is 12 inches in diameter. It has been designed to reproduce well a range of from 50 to 4500 cycles. As the cross-section diagrams show, this is actually the outer and main cone.

To handle the frequencies between 4500 and 8000 cycles, there is a second cone also attached to the voice coil, and joined to the main cone about five inches from the centre. This cone is specially made to favor frequencies of this nature, and can vibrate independently of the main cone at these frequencies.

The third cone, as will be seen, is something like the familiar "tweeter cap" which we have seen in the past. It is dome-shaped, and tunes the mechanical circuit of the second cone to operate at a higher amplitude, thus increasing the output on the higher frequencies.

The largest diaphragm is attached to the voice coil. The other two fasten to the first at its apex.

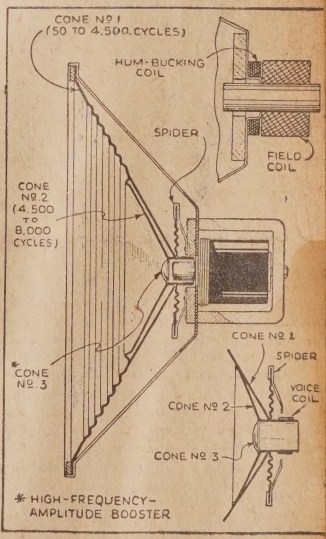
Our own experience with speakers and combinations of speakers has demonstrated that the mere fact of using different cones for different frequency bands, particularly if the split is made outside the low-frequency range, tends to give a cleanness to the results which a single speaker, no matter how good, does not appear to achieve. It is a much bigger subject than appears on the surface, but such things as modulation of some frequencies by others and the harmonics of others no doubt plays an important part.

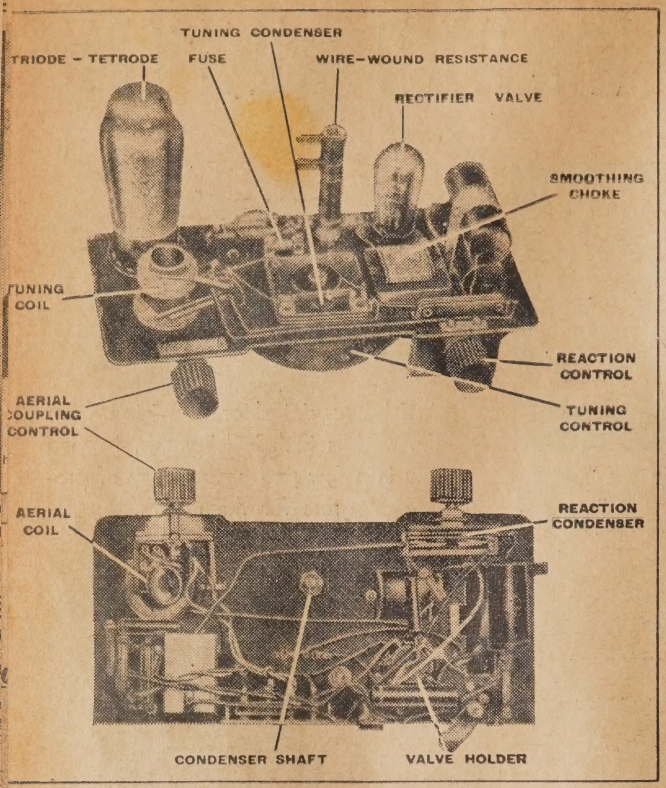
So one would expect this speaker if mechanical troubles have been successfully ironed out, to give an excellent account of itself.

The makers of this new speaker claim that the uniform response over the entire range as compared with that of any other speaker is considerably better, and has never been equalled. The blending of the two ranges gives a characteristic which sets a new standard in fidelity. As far as we know, such speakers are not available in Australia, nor do we know if there is any intention to import them. We give this description merely for its own interest, as something new in design application.

The speaker is a product of the American R.C.A., and we show here a graph comparing its response curve with that of a standard reproducer.

A cross-section of the speaker illustrating the construction of the cones.





Two views of the "People's Set," showing its absurdly simple construction. This set sold three millions in five years.

THE PEOPLE'S SET

This article, from the English "Wrieless World," is reprinted in part, and tells the story of Germany's efforts to produce a set which everyone can buy. Its design is so simple, and its performance so limited, that we would consider it almost useless, except for use on a few local stations. Germany, however, does not encourage the practice of listening-in to stations of other countries.

☆

CO-OPERATIVE production of radio sets is probably not a question of immediate practical interest in England.

As one of the successful solutions to the problem of effective price reduction or increase of sales possibilities—the German People's Set scheme should, however, command attention, the more as comparatively little has so far been published about the details, and widely differing opinions seem to prevail as to the success, both with the manufacturer and the public.

It may, therefore, be worth while to give an authentic account of the situation as it appears after five years of practical experience.

Co-operative methods are, as a general rule, resorted to only where individual effort has failed, or may be expected to do so.

ORIGINATED IN '33

The co-operative scheme under which the German People's Receiver and its various followers were produced was no exception to the rule.

The idea originated because in 1933 the prices of receivers in Germany were absolutely and relatively too high. Absolutely, because the lack of sets within the purchasing power of the masses was limiting sales, especially in the rural areas. Relatively, because German prices were considerably in excess of world prices. It should be remembered that 1930 saw the beginning of the great price drop in U.S.A., and that the British and Dutch radio industries had effected drastic reductions of receiver prices by 1932, the downward tendency apparently continuing.

AVAILABLE TO ALL

Prices in Germany, however, had remained practically unchanged throughout this period, protected by an effective price agreement among manufacturers.

As the Hitler Government looked upon radio not only as one of the commodities that should be within the purchasing power of the poorer as well as the richer classes, but also as an important means of conveying propaganda, plans were immediately considered for a drastic reduction in set and valve prices.

The methods successfully applied in U.S.A and, to a lesser extent, in England, could not, for a variety of reasons, be used in Germany at that time. The ruling consideration in those days was to find occupation for six and a half million unemployed. Price reduction by labor saving, therefore, appeared to be out of the question—and the American method evidently consisted mainly in cutting down labor by installing highly specialised machinery.

It was also thought dangerous to interfere with normal production and distribution, as nobody could foresee the effect of drastic price reductions on existing stocks and on merchandise in course of production—not to speak of the difficulty of bringing about any appreciable price drop without reducing the labor component.

The way out of this conundrum was the design of an entirely new type of receiver, with the simplest specification compatible with the purpose in view and definitely less ambitious than anything else on the market. Such a set, if sufficiently cheap—say, about half the price of the nearest type of proprietary set—would, it was argued, create an additional market without disturbing the sales of normal sets.

NEW AND CHEAP

The next question was as to who should manufacture this set. While the idea of erecting a special factory for the purpose (as realised later on for the People's Car) was doubtless also discussed, it was soon dropped for the much simpler scheme of manufacture on a co-operative basis, all existing receiver factories, to the number of 28, having a share in the production corresponding to their share in the total set market of the season before.

It was only necessary to co-ordinate the production in such a way as to ensure punctual delivery of the quantities agreed upon by the industry and identical appearance, as well as performance, of sets independent of the manufacturer.

The article is more than a description of the receiver. It can be taken as an authoritative survey of the position which led to its development. Any precis of such an article would tend to spoil its interest, so we make no apologies for reprinting so much of it in these pages of review. The receiving valve used in the set is not obtainable in Australia.

☆

The latter point demanded a detailed specification and a neutral institution where parts and assembled sets could be tested. The former could well be left to the existing organisation of the industry—the Radio Manufacturers' Economic Association or W.D.R.I.—membership having been made compulsory under the new regime.

Such, then, was the plan in outline. Its reception by the industry was mixed—as might be expected of a plan so novel and daring. It was feared in industrial circles that the People's Set might monopolise part of the existing market at prices ruinous to the industry. Evidently the entire plan stood or fell with the possibility of creating a completely new market without sapping the existing one.

GREAT MONEY-MAKER

As a matter of fact, the apprehensions of manufacturers were later proved to be unfounded. Not only was the entire volume of People's Set sales—totalling about three millions in five years—an addition to the otherwise stable figure of proprietary receiver sales—about one million a year—but it so happened that the People's Set, in spite of its extremely, and at first sight impossibly, low price, was a first-class money-maker, saving several tottering small firms from the hands of the receiver.

The solution of the enigma was in the magic words "mass production." It was only natural that manufacturers gradually learnt how to save a penny here and another there until prices that once appeared disastrous were found to hold an ample margin of profit. A year and a half ago the price for the (slightly improved) first model was reduced by about 15 per cent. without a murmur from the industry.

NEWER AND CHEAPER

This season—the popularity of the first model having gradually declined after five years of production with but a slight change in valve equipment—a new small People's Set was introduced at not quite half the price of the original model, with about the same performance, and there is nobody who doubts that it will be a sound business proposition. Mass production on a scale to warrant similar prices would have been almost impossible for individual manufacturers without official backing and help of propaganda, and with the need to fight their competitors into the bargain.

The cutting down of distribution costs played an important part in reducing the price of the German People's Sets, while the Telefunken licence—equivalent to the Marconi licence in England—was dropped. Moreover, Telefunken designed special valves for these sets and sold them to manufacturers at practically cost price (at the time, apparently, counting on a safe profit in the long run).

The design of the People's Set has nothing unusual. It was, in fact, the work of a small committee of engineers of leading radio firms, under the auspices of the manufacturers' association, as in all subsequent cases of co-operative models. This body agreed on the circuit, built three or four competitive models, and decided on the final details. Complete drawings were then made and tenders invited from the parts industry for the various components.

REAL CO-OPERATION

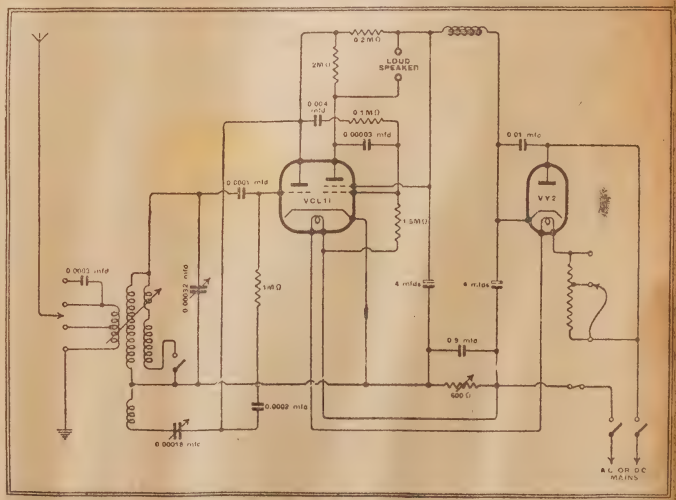
Prices were definitely fixed after comparison, and a list of manufacturers for every component drawn up. Components were tested by the Heinrich Hertz Institute, a research foundation formerly subsidised by the industry and to-day financed by the Government. Radio firms assemble sets from these standard components. They may, of course, be manufacturers of certain components as well, and get these from their own workshops, as well as supplying them to other firms.

Loud speakers were at first exclu from the list of such components. T had to be bought from the loud spea industry, as this group was at the ti suffering from the decline in loud spea sales due to the disappearance fr the market of sets with separ speakers. This is mentioned as typi of the spirit of collaboration preval in the German manufacturers' assoc tion and enabling the comparativ smooth working of these co-operat schemes.

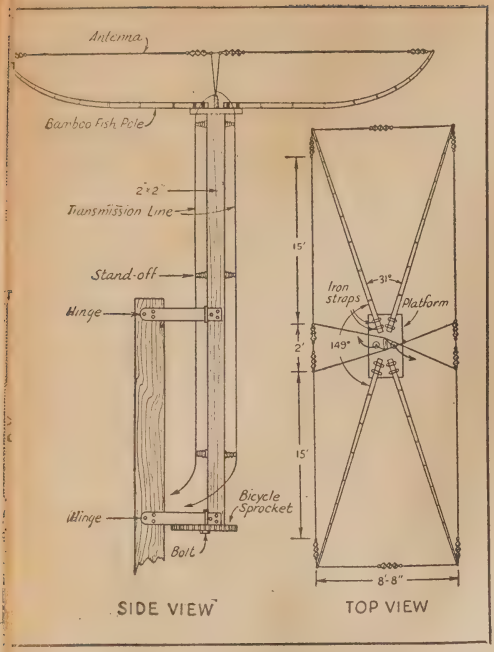
OTHER SETS

It should also be remarked that t Government has limited itself to supp ing the first suggestion and the gene outlines of the scheme, after consultati with those concerned. There is, course, no denying the fact t co-operation within the industry mig not have been what it was with active Government interest, and all t might imply for potential dissenters.

The indubitable success of the fi People's Set, which was a simple tw valve regenerative detector with electi magnetic speaker, originally priced 76 marks (marks can be consider equivalent to shillings as regards pu chasing value), and later reduced to marks, led to the creation of seve other "co-op." sets. The first of the the DAF, was designed for communi reception in factories, and has a ve high-class specification for sou quality. It is used as a receiver in co junction with amplifiers of differe power. A small battery portable, t Olympia Koffer, was brought out in t year of the Olympic Games, hence name. It was developed by a firm wi special experience in the portable fie and manufactured by several, but n all, others. An improved edition of th straight four-valve receiver was broug out in 1937.



The circuit, shows the use of a special detector and output valve, the rectifier being the only other one required.



oor Man's Rotary Beam

OME time ago, we at W5EOW were overcome by the urge (and wild claims. too) to partake of the advantages of a rotary beam. So, with a hand on the purse, we looked at catalogues listing such gadgets. Our dismay surprise at the cost of even the simplest were surpassed by the realisation that our rig, receiver, and living-room iture had cost less. That first urge was much too great, ever, so designs and plans were examined. Disappoint- it was again our lot, however, for in each case machined ngs were necessary and costly. It seemed necessary, efore, that a rotating device be designed from parts tainable at the dime store. With this in mind, the angement to be described was evolved.

A pair of barn or strap hinges was purchased for 25 ts and mounted on a 20-foot 2 x 2, according to the tch. In our case, the top hinge is placed so that it mounts on a convenient joist piece of a house gable, while the other hinge is bolted to a short length of 4 x 4 post driven into the ground. It must be understood at this point that this is not the only possible method of mounting; in fact, this handy little rotator can be mounted in more ways than can be described. For simplicity, the illustration shows another pole as a mounting. We now have a 2 x 2 standard which rotates through an arc of 180 degrees.

To provide control for this rotation, the pin is removed from the bottom hinge and replaced by a machine bolt of longer dimension. This bolt runs through the centre hole of a toothed wheel which was bought second-hand from a bicycle shop for 30 cents. In addition to the centre hole, another 1-8-inch hole is drilled 1⅛ inches from centre for a wood screw which will be screwed into the bottom of the 2 x 2. A bicycle chain is then used to control the rotation from the operating position.

This brings us to the antenna itself. We have said that our pole rotates through an arc of 180 degrees. Our antenna, therefore, must be of the bi-directional type. In our own case, the "8JK" type was chosen because of its simplicity and ease of adjustment. Accordingly, one was made up with two 30-foot sections with a break of 2 feet at the centre of each and spaced 8 feet 8 inches.

In the construction, all insulators are attached and the system is laid out upon the ground. The two spacing wires, each 8 feet 8 inches long, are fastened at each end as shown in the sketch. These wires should be broken up with strain insulators, since their only purpose is to maintain the spacing at the ends of the antenna; they are not a portion of the radiating system. The centre cross-over wires are now put in place, using a 6-inch spreader at the centre to separate them.

FISHING POLE SUPPORTS

The supports for the antenna proper are four 22-foot fishing poles which we purchased for one dollar. These poles are mounted on a 12-inch x 12-inch piece of 1-inch oak by means of eight metal conduit fasteners. They are arranged so that the angles embracing the antenna wires are each 149 degrees. Obviously the opposite angles are 31 degrees. We now mount our antenna on the tips of the bamboo poles, bending each up about 4 feet. A little trial and error will be necessary to find the position at which all corners are level.

We now mount the platform on top of the 2 x 2, using four angle-iron pieces and machine bolts; wood screws are not satisfactory. Our matching section is attached to the centre of the cross-over wires, goes through two feed-through insulators in opposite sides of the square platform, and is supported throughout its length by small porcelain stand-off insulators fastened to the sides of the 2 x 2. The shorting bar and feeder may be attached according to the dictates of each builder. Their adjustment has been covered many times in "QST" and the "Handbook," and will not be repeated.

Due to the low cost, in our case 2.75 dollars, separate rotaries for the 5, 10, and 20 metre bands are planned at W5EOW. It works so well that we know that the antenna just doesn't realise what a cheap rotator is pushing it around.—Q.S.T.

☆

INVISIBLE GLASS

Drs. Arthur F. Turner and C. Hawley Cartwright, physicists at the Massachusetts Institute of Technology, who have jointly developed a method of making "invisible glass" by depositing a thin film of sodium fluoride on the surfaces of clear glass, are shown making measurements of reflection and light transmission on the Hardy spectrophotometer.

"AN AMPLIFIER TO END AMPLIFIERS"

THE "Amplifier to End All Amplifiers" was born of a desire to remedy this situation by producing one multi-purpose amplifier to replace all of the others.

We wanted an amplifier to satisfy our amateur radio requirements, but also capable of both producing phonograph recordings and playing them back. And in addition to this we wanted broadcast reception with really good quality.

With these requirements in mind, everything else in the shack even remotely resembling an a.f. amplifier was junked, and one unit, the "Amplifier to End All Amplifiers," was designed and built.

CIRCUIT

The circuit finally evolved is entirely resistance coupled and features push-pull 2A3's in the output stage. The gain of the system is sufficient to work from a sound-cell crystal microphone.

The undistorted output of 10 watts is enough to drive a high power modulator, plenty to grid modulate practically anything, and sufficient to plate modulate a low-power transmitter.

Two input channels are provided. In our own case, one is fed by a sound-cell crystal microphone and the other by a crystal phonograph pickup. Mixing of the two, or of any other signal sources of similar impedances and levels, is accomplished by an electronic mixing system wherein the higher level source is fed into the screen grid of the 6J7 preamplifier tube.

Microphone level is controlled by the gain control R2, and the phonograph level by R1. R2, of course, actually affects both signal sources, but this is of no consequence as the phonograph is usually used along with the microphone only for the purpose of providing a music background for speech and this background may be faded in and out of control R1, without affecting the microphone level. If the phonograph is desired alone, the microphone may be shorted out by the switch S1 in the control grid of the 6J7.

BUILT-IN TUNER

The simple superheterodyne broadcast tuner used has but one outstanding feature: its tone control. Instead of merely attenuating highs, the control R3 varies both highs and lows.

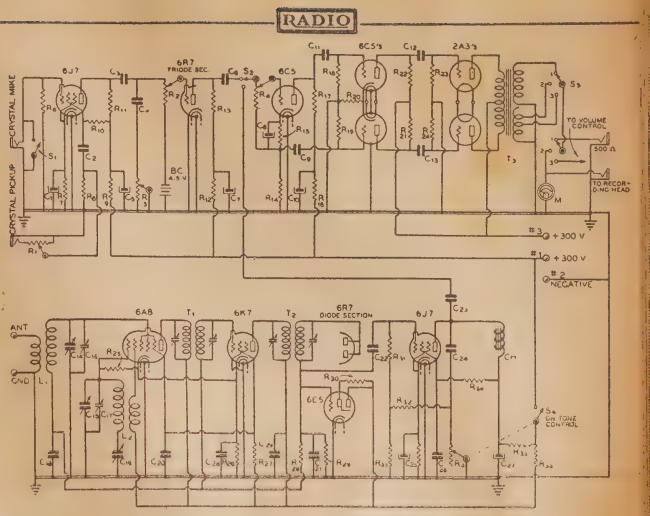
When R3 is in full counter-clockwise position, the response of the system is normal; but as the maximum clockwise position is approached, the inverse feedback condenser, C1, is in effect brought more and more in shunt with the plate impedance, L1.

At maximum clockwise position, L1 and C1 form a circuit which resonates at about fifty cycles. This has the effect of attenuating highs, while at the same time boosting lows considerably in the region below one hundred cycles. The control may be backed off slightly from full clockwise position in order to let highs through without diminishing the bass-boosting effect.

The switch S2 cuts the tuner in and out of the circuit. The radio volume is varied by the control R4, which also functions as the master gain control for the whole system.

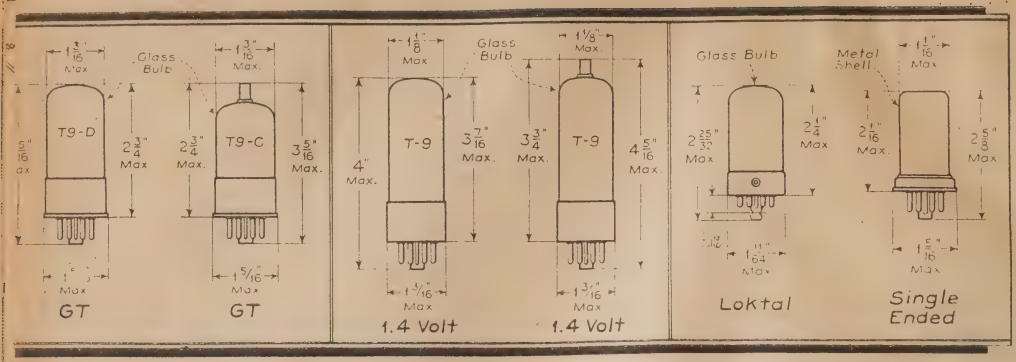
Jumping to the output circuit, we find that the output transformer used has a universal secondary which feeds into a switching arrangement. This arrangement allows the amplifier to be fed, respectively, into a five-hundred-ohm line, into a recording head, or into a speaker voice coil, merely by selecting the correct switch position. When the recording position, a red bull's lights up under the volume indica meter.

Hum level is kept low, and any te dency toward motor-boating is defea through the use of resistance-capac decoupling filters and through the u of independent power supplies for t low level channel and for the high le channel. The power supplies mounted on a chassis separate from th of the amplifier itself. If more inp channels than those already provic had been desired, a multi-contact sel tor switch could have been employ at S2, with each contact being brou out to a separate input jack.—Radio.



Circuit of the radio amplifier and broadcast tuner.

C_1—.25-μfd. 25-volt electrolytic
C_2, C_3—0.1-μfd. 400-volt tubular
C_4—.01-μfd. 200-volt tubular
C_5—8-μfd. 450-volt electrolytic
C_6—0.1-μfd. 400-volt tubular
C_7—8-μfd. 450-volt electrolytic
C_8—25-μfd. 25-volt electrolytic
C_9—0.1-μfd 400-volt tubular
C_{10}—8-μfd. 450-volt electrolytic
C_{11}, C_{12}, C_{13}—0.1-μfd. 400-volt tubular
C_{14}, C_{15}—Two-gang b.c. condenser
C_{16}, C_{17}—Mica trimmers on b.c. condenser
C_{18}—.04-μfd. 200-volt tubular
C_{19}—300 - to - 500 - μμfd. oscillator series padder
C_{20}—0.1-μfd. 400 - volt tubular
C_{21}—200-μμfd. mica
C_{22}—.05-μfd. 200-volt tubular
C_{23}—0.1-μfd. 400-volt tubular
C_{24}—.02-μfd. 400-volt tubular
C_{25}—25-μfd. 25-volt electrolytic
C_{26}—0.1-μfd. 400-volt tubular
C_{27}—8-μfd. 450-volt electrolytic
C_{28}—.25-μfd. 200-volt tubular
C_{29}—0.1-μfd. 400-volt tubular
R_1, R_{21}, R_{31}, R_{41}—500,000-ohm potentiometer
R_2—5 megohms. ½ watt
R_3—2000 ohms. 1 watt
R_4—100,000 ohms. ½ watt
R_5—25,000 ohms, 1 watt
R_{10}—2 megohms, ½ watt
R_{11}—250,000 ohms, 1 watt
R_{12}—15,000 ohms, 1 watt
R_{13}—25,000 ohms, 1 watt
R_{14}—50,000 ohms, 1 watt
R_{15}—2000 ohms, 1 watt
R_{16}—15,000 ohms, 1 watt
R_{17}—50,000 ohms, 1 watt
R_{18}, R_{19} — 500,000 ohms, ½ watt
R_{20}—1000 ohms, 1 watt
R_{21}, R_{22} — 50,000 ohms, 1 watt
R_{23}, R_{24} — 250,000 ohms, ½ watt
R_{25}—50,000 ohms. ½ watt
R_{26} — 200 ohms. 1 watt
R_{27}—50,000 ohms 1 watt
R_{28}—1 megohm ½ watt
R_{29}—500,000 ohms, ½ watt
R_{30}—1 megohm. ½ watt
R_{31}—250,000 ohms, ½ watt
R_{32}—1 megohm. ½ watt
R_{33}—750,000 ohms, ½ watt
R_{34}—2 megohms, 1 watt
R_{35}—15,000 ohms, 1 watt
T_1, T_2—465-kc. i.f. transformers
T_3 — Output transformer, 5000 ohms to 500, 15 and 9 ohms
CH_1 — High-impedance plate choke
L_1, L_2—Broadcast detector and oscillator coils
S_1 — S.p.s.t. toggle switch
S_2 — S.p.d.t. toggle switch
S_3—Two-pole three-position switch
S_4—S.p.s.t. switch
M—0-1 d.c. milliammeter
BC—4½-v. midget "C" battery or 3 bias cells (3.75 v.)



is diagram shows the comparative sizes of the GT valves, the 1.4 volt types, and the Loktal and Single-ended. No doubt these valves will be rigorously tested in Australia during the next few months.

ORE NEW VALVES!

HE latest copy of "Service," the American magazine, published details of still more valves which have been released over the other

ese are interesting from several ts of view.

e first series is, of course, the 1.4 types, which we are already using in Australia. We have published ls of these valves several times, here is little need to say much about them here.

e single-ended valves, of which we already written in "Wireless kly," are available now in a comrange.

eir feature is that the grid cap is longer used—both grid and plate being brought through the base he valve.

order to prevent interaction be- e of this, special shielding is used the base of the valve, and the ngement of pins has been altered eep grid and plate pins as far from other as possible. Not only is e a cone-shaped shield extending n between the pins in the base, but locating plug has inside it a metal ndrical shield, which still further in preventing feedback from grid late. All these valves are metal s.

ere are eleven valves in the range, ding a series which are similar, but h use 12-volt heaters. The only difference is this, and the numeral 12 instead of 6 in the type number tells of the difference. The filament has only .15 amps. drain instead of .3 amps. at 6.3 volts.

Here are the new single-ended types:—

6SA7, a single-ended pentagrid converter valve, specially designed for all-wave sets. The oscillator section is designed to operate in a Hartley circuit, with the cathode connected to a tap on the oscillator coil. It may also be separately excited as a mixer.

Using a special structure, the 6SA7 has excellent oscillator frequency stability. The magnitude of the input capacities of the oscillator grid is not affected appreciably by the signal-grid bias—changes in cathode current and in oscillator transconductance with A.V.C. voltage are small.

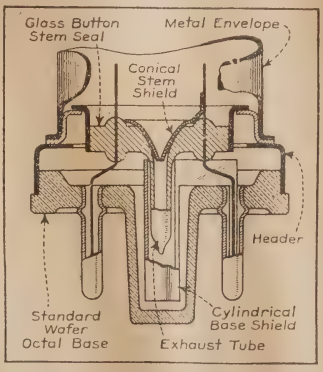


Fig. 1. The new constructional design of the tube base (above) allows the grid lead to be brought out at the base of the tube. The resulting single-ended metal tube employs the familiar octal socket shown to the left. Loktal tubes are also single-ended but are all glass and use the socket shown to the right. The bulb shapes and dimensions are shown below.

6SC7—A twin-triode amplifier intended primarily for phase-inverter service. Each triode has a "mu" of 70 to give high gain.

6SF5 is a high-mu triode with characteristics similar to those of the 6F5.

6SJ7—An R.F. pentode of the sharp cut-off type, having a mu of 2500 on maximum ratings.

6SK7—A remote-control R.F. pentode for use in A.V.C. circuits.

6SQ7 is a duo-diode high-mu triode valve with characteristics the same as those of the 75, except, of course, for its single-ended construction.

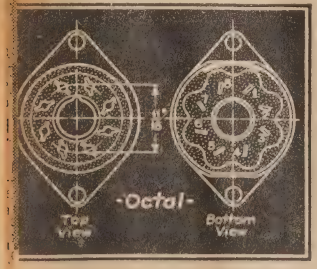
The 12-volt companions to these valves are known as the 12SA7, 12SC7, 12SJ7, 12SK7, 12SQ7.

LOKTALS

Loktal valves are single-ended glass valves about the same size as the corresponding metal types. They are all 3-16ths inches in diameter and less than 3 inches high.

Unlike ordinary valves, there is no base as we know it. The prongs of the Loktal valve are sealed into the glass base plate on which the tube mount is assembled. A metal guide ring fits over the lower part of the valve. The base has a key somewhat similar to that used in an octal base. The Loktal key, however, is made of metal and has an indentation around the lower part which locks into a snap ring in the socket, thereby locking the valve into place.

Despite the fact that Loktal valves



are single-ended, there is no top grid cap.

The Loktals are very valuable in A.C.-D.C. sets because of their lower filament current ratings.

The types are:—

7A6 is a duo-diode very similar to the 6H6G.

7A7 is a single-ended pentode with characteristics similar to those of the 6K7G.

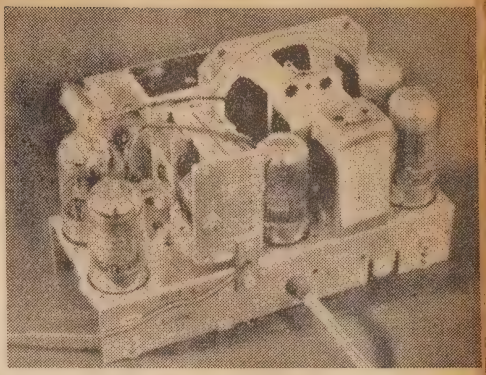
7A8 is a single-ended frequency converter similar in characteristics to the 6A8G.

7B7 is a single-ended pentode similar to the 6S7G.

7C6 is a single-ended duo-diode triode something like the 75. It has a high-mu triode section, for which fixed bias is not advised. A high-resistance grid resistor should be used in conjunction with a .25 meg. plate resistor.

7Y4 is a full-wave cathode type high vacuum rectifier something like the 84.

An American receiver, showing how the new midget valves allow chassis to grow smaller and smaller.

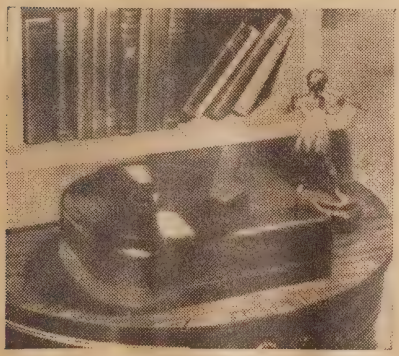


35A5 is an output pentode something like the 25L6G, with a 35-volt heater.

35Z3 is a half-wave rectifier meant to work with the 35A5.

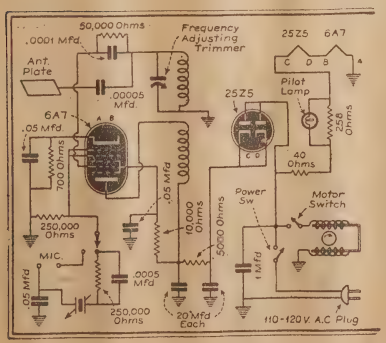
The G.T. types appear to be min tures of the 12-volt single-ended valv but are much smaller, as our illustrat shows.

REMOTE CONTROL UNITS FOR PICK-UPS



Above.—The R.C.A. Unit.

Below.—The circuit used.



THE latest craze in U.S.A. is for remote control units which will allow records to be played through a radio set, but without a connecting wire.

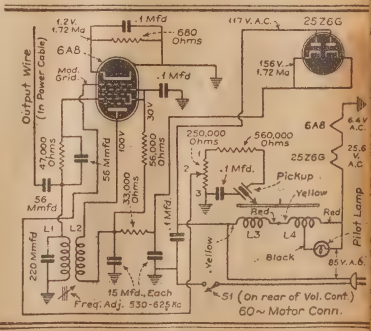
The devices are, in fact, small transmitters. An oscillating receiver valve is modulated by the output from the pick-up, and the signal that results is picked up by the set, and heard via the loudspeaker.

The idea is quite a workable one, and we have carried out some experiments in the past with such units. The attitude of the P.M.G. towards them in Australia, however, is rather hard to gauge. They are actually unlicenced transmitters, and could be picked up some distance from the set. In the event of interference with the neighbor's programme, trouble might start!

We may be able to arrange for one of these units to be described in our next issue.

Above.—The "Admiral" Unit.

Below.—Its Circuit.



What is COLD?

not this man!

ce again, our racy corre-
ndent has written us an ab-
bing article on a popular
ject. No one will deny, as
iter approaches, that he has
nosen a seasonable subject.

ETTING out the old top coat can be a most fascinating pastime if carried out properly. First of all, you give it a good shake in r to dislodge any stray moth balls, hthalene, or loose insects. hen you go very carefully through pockets, beginning with the small ch pocket inside where perhaps some otten loose change may be resting. f course, if you left it to your wife but the coat away for the summer, won't find any loose change.

DS AND ENDS

he next pockets are the outside ones. re is a repository for such interesting ems as bills that you swore to your litor you didn't receive; last winter's en tickets, and a receipt for mending n umbrella; betting slips and a piece caramel adhering to the bottom of lining, and if you are a radio crank, e screws, nuts and washers and cir- diagrams.

sn the whole a most interesting half- r can be spent in this way. But if are really wise you will just take m all and dump them before hand- the coat to your wife to have the h holes darned.

TTING AND KEEPING WARM

ome people wear a top coat in order keep warm, some to GET warm, and ers to hide the patches in the seat their pants. In any event the cold something to do with it. And what cold? Fundamentally there is no thing. Cold is really a low degree heat. It is only relative.

he freezing point of water is 32 de- es above zero Fahrenheit. But this warm compared to something with emperature of zero degrees. Likewise emperature of 52 degrees feels fairly l to us, yet if the temperature was 40 degrees yesterday, Mr. Mares says that it is warming up. So that whatever the temperature down to a certain point, as I will explain presently, there is always a certain amount of heat left.

The temperature of any substance is dependent on the state of the molecules of which it is composed. When a substance is hot, the molecules are in rapid motion. And the degree of heat depends on the rapidity of this motion. So that the slower the motion the cooler the substance becomes.

STRIKING MATCHES

When you go out for the day and tear down somebody's fence to boil your billy, you strike a match. The friction causes the molecules of the match head to strongly object, and they run about very rapidly, get hot and bothered, and cause the match head to burst into flame. The application of the flame to the wood brings about a like reaction, and the wood burns.

The flame of the fire causes the molecules in the bottom of the billycan to move rapidly, which in turn causes the water particles to vibrate, and this reaction in time becomes so great that the particles of water can no longer take it, and they leap into space in the form of steam, and begin to push the lid of the billycan off in their anxiety to escape. All this time the molecules are performing work, and like every other object, both human and otherwise, their energy is gradually dissipated, and they begin to slow down. Providing, of course, that they are not kept on the move by the application of more fire.

COLD TEA!

This slowing down process continues until the molecules are moving at the same speed as those of the surrounding air, and we call this cooling down. If we artificially retard the motion still further the substance becomes colder and colder. When a substance is extremely cold and you momentarily touch it, you will receive much the same sensation as touching a very hot object.

Many people have been fooled this way, and it is very disturbing to find that you have made the tea on a frosty morning with a kettle full of icy water. Such a waste of time, too.

TOP COAT AGAIN

Now we may be able to understand what happens when we don our top coats. If we put it on in order to KEEP warm we put it on before we go out. That means that the molecules of our skin are moving at a fairly rapid rate, and our top coat simply prevents the cold air from coming into contact, and slowing them down.

You know the idea. You go visiting and your hostess says, "Do take off your top coat, otherwise you will not feel the benefit of it when you go out." So you remove all your valuables and

your wife's powder puff and your tobacco, matches, pipe, and whatnot, and hang it in the hall, where you can keep an eye on it. I know a man who is a debt collector, and he tells me that he always carries his top coat over his arm and puts it on when he rings the door bell. The reception he gets is always so cold.

If you put your coat on to GET warm it means that the molecular motion of your skin having been already retarded, your coat prevents the cold from getting in, and allows the internal heat of your body to speed the motion up, and you become warmer. The cloth of which your coat is made is a poor conductor of heat or cold, and acts in such a way as to keep in the heat and keep out the cold.

MORNING LEAP

Some people are late for work of a winter's morning due to the fact that after being suddenly awakened by the alarm clock they leap out of bed to switch it off, instead of putting the clock in a handy place, so that merely by reaching out they can turn it off and go to sleep again. However, having leaped out, their feet come into contact with the linoleum. How cold it feels! So they go back again.

Actually the lino. is no colder than a carpet. A thermometer placed on the lino. would register the same temperature as that of the carpet or the air. What really happens is that the lino., being a good conductor, suddenly retards the speed of the molecules of your skin, and you feel as if the iceman has left the ice in the wrong place. On the other hand, the carpet, being a poor conductor, does not retard the moleculer motion so violently. The best idea is to go to bed with your socks on.

By going still further we obtain a solid, and the solid starts to contract. Some scientist chappie discovered that for every degree Centigrade of cooling from 0 degrees down the gas lost 1/273 of its original volume. Fancy fooling around to that extent!

Seems to me that if the Gas Company found out about this we would be getting cold gas without any volume. It wouldn't be any fun to turn the gas on and get a squirt of snow out of the pipe.

ABSOLUTE ZERO

Well, this scientist chappie thought it out, that if he could cool a gas down to 273 degrees below zero Centigrade, it would disappear, and he would have reached the temperature of absolute zero, where heat ceases to exist. So away they went pumping and compressing until a Dutchman named Professor Keesom succeeded in freezing helium to 272.18 degrees below zero. This is the lowest on record. Only 0.82 degrees above absolute zero. Even then he said it was too hot.

Perhaps it was just as well he got no further. Some people said that all matter would disintegrate at absolute zero. Imagine a dictator getting hold of an invention of that kind.

If you would like to feel a temperature some 150 degrees hotter than this scientist obtained, just sit on a lump of that dry ice that comes round ice cream bricks. This is solid carbon dioxide, and is about 120 degrees below zero. Oxygen liquefies at 181.5 below zero into a pale blue liquid, and is strongly magnetic. The gas fluorine liquefies into a yellow liquid at 187 degrees below zero, and can be frozen into a white solid. Ozone becomes an intensely blue liquid at 120 below. Liquid air is a common by-product in some factories. Liquid air has been frozen solid, and consists of a jelly-like mass with an outer shell of solid nitrogen enclosing liquid oxygen. And the oxygen can be pulled through the shell by means of a magnet. Hydrogen when liquefied is the lightest liquid known.

Whether scientists or anybody else will ever reach the temperature of absolute zero remains to be seen. Anything can happen nowadays, and anything may happen if they ever get to this lowest of low temperatures. In the meantime 60 degrees above zero Fahrenheit is good enough for me. And give me the good old coke fire, with plenty of soda with a splash, and I will leave the liquid oxygen for the Esquimos to drink. Or for those fellows who go surfing at 7 o'clock in the morning in the middle of winter.

By ◆ ◆ ◆ ◆
CALVIN WALTERS

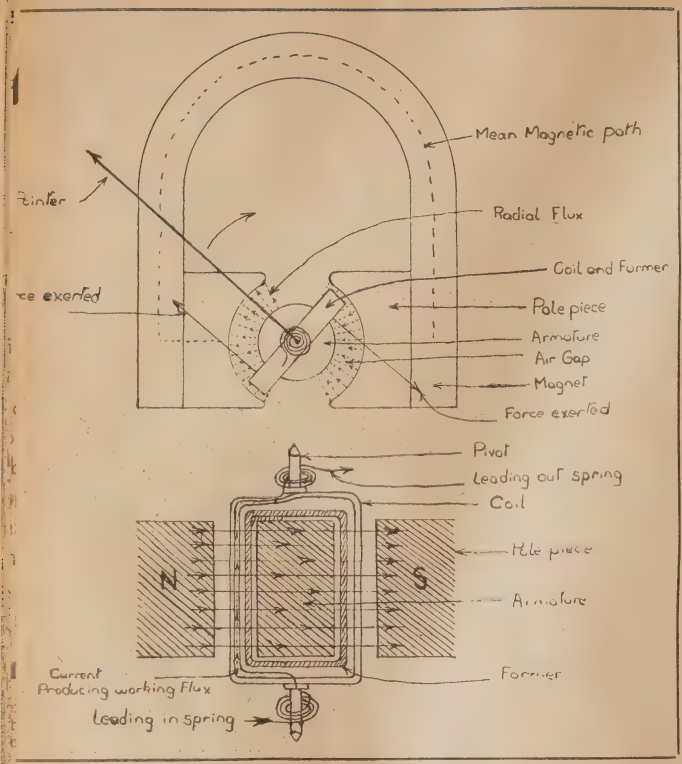
Having now, I trust, satisfactorily disposed of the usual degrees of cold or low degrees of heat, we will go to the unusual.

If we could keep on retarding the molecular motion, would we ever reach a point where heat absolutely ceases to exist? This is something on which to let your imagination run wild. How low a degree of heat can we get? And if we get there will anything remain? We may not remain ourselves. Even our remains may not remain. Where am I now? Oh, yes. We are talking about the lowest degree of heat.

It is a well-known scientific fact that if we start compressing a gas we will bring its molecules closer and closer together and retard their motion. If we keep on at this business we will bring them so close together, and retard their motion so much that the gas becomes a very cold liquid.

HOW FAST IS LIGHT?

Very fast. 186,000 miles per sec in fact. This is the same speed as e tricity, and it's certainly a great sp Notwithstanding this fact, many s are so far away from the earth that t distance is measured in light-years. light year is the distance light travel one year at 186,000 miles per second



s diagram shows the essential components in an ordinary D'Arsonval moving-coil meter.

The DESIGN

this article it is intended to briefly explain how a meter works, as well is the essential parts that are used, nd the bearing these parts have in final design of such a meter.

he moving coil meter gets its name in the fact that the coil carrying the ent it is desired to measure rotates a strong magnetic field, the degree of tion depending on the current ngth passing through this coil, and ors depending on the design of the er itself. These other factors will dealt with further on.

will be as well to describe the mag- first, as the whole action and design he moving coil meter centres around

E MAGNET

assume that all readers understand elementary principles of magnets, the laws regarding like poles re- ing and unlike attracting each other, it will be in order to briefly repeat e of them. Now the force of mag- c attraction and repulsion between magnets decreases rapidly as the ance between them is increased, and course increases as they are brought er to each other. This force of at- tion or repulsion is inversely propor- al to the square of the distance be- en them as can be seen from the ple equation: F equals mm1 over d2, re m and m1 are the pole strengths each magnet, d2 is the distance be- en them, and F the force exerted. This relation is an important one in the sensitivity and life of a meter as will be seen further on.

Now briefly, the space around a magnet is called the magnetic field, and the direction in which the magnetic force is acting at any point in the magnetic field, as a line of force. The total number of lines of magnetic force crossing a given space or field is called the magnetic flux, and the strength of the magnetic field at any point per square unit area is called the flux density.

By E. J. PACKER
ENGINEER, PATON ELECTRICAL PROPRIETARY, LTD.,

HORSESHOE MAGNET

In bar magnets the poles are always acting upon one another and exercising demagnetising forces on the magnet material between them, as the lines of force must also travel a long path through the air which is a very poor magnetic conductor. In moving coil meters a magnet of the horseshoe or U type is generally used, for the path is mostly through iron which is a good magnetic conductor, thus making this type of magnet a much stronger one than the bar type.

Two soft iron pole pieces are secured to the poles of the magnet, soft iron is used here for it possesses a greater attractive force than hard steel, while the magnetising force is present. Also, soft iron pole pieces allow of the movement to be mounted on these before the magnet is finally attached, thus simplifying construction.

Generally speaking, only about two types of magnets are used in present-day commercial instruments; these are known as the Cobalt and Alnico magnets.

The Alnico magnet is about 2½ times more powerful than the Cobalt magnet, and is generally used in microampere and high speed meters, where high sensitivity is required, while the Cobalt finds its uses in the milliamp meter class, where the sensitivity is not so great.

All magnets are hardened, magnetised and steam-heated to artificially age them before using, so as to stabilise their characteristics, and thus ensure a magnet of uniform intensity over a long life.

SAFETY FACTOR

Another factor that plays a very important part in the life of a magnet is what is known as the safety factor of the magnet.

This safety factor takes into consideration the length of the mean magnetic path, length of the air gap between the two poles, area of cross section of the magnet and the area of the pole face.

As you all know, it is necessary to put a "keeper" across the magnet in the form of a piece of soft iron to retain the magnetism when the magnet is not in use. Now in a meter it is evident that a keeper could not be used for then the air gap would be considerably weakened, owing to the fact that all the lines would pass through the iron instead of through the air gap.

The size of this air gap is therefore of importance as regards the life of the magnet, so the above safety factor fixes the maximum air gap that can be used for a given size magnet, pole pieces, etc., consistent with long life. This safety factor varies for different magnets, but is generally between 100 to 500 for most commercial instruments. Though with magnets of Alnico and Cobalt types much lower ratings are sometimes used owing to their high coercive force.

The coercive force of a magnet is really a measure of the permanence, and therefore the merit of a steel used for the magnet.

A soft iron armature is placed between the two soft iron pole pieces, and firmly held in place by non-magnetic supports. The purpose of the armature is to strengthen the magnetic field between the poles by reducing the air gap, thus reducing the reluctance of the flux path, and hence increases the sensitivity of the meter.

The pole pieces have their inner faces concave, and in conjunction with the cylindrical armature cause the magnetic

OF MOVING-COIL METER

An everyday subject made easy

Every radio man from time to time has reason to use a meter of some kind. The most popular type of meter is known as the "D'Arsonval" after its originator. This tells you some of the things involved in meter design

flux in the air gap to be practically radial, and having a uniform density except at the tips of the pole faces.

TOTAL FLUX

From the accompanying sketch this radial field will easily be seen.

The total working flux or usable residuay magnetism varies from 10 to 40 per cent. of the maximum obtainable owing to magnetic dispersion at the poles.

The induction density in the air gap varies quite considerably in different types of meters, depending upon the type of magnet used, and the length of the air gap, as well as the dimensions of the magnet, pole pieces, and armature. In the average commercial moving coil meter it may be anything from 500-2500 gausses, and in some cases greater than this.

The working flux divided by the induction density gives the area of the pole faces in sq. cm. Actually, though, in quite a number of different makes of meters a much lower ratio is used, giving a pole face area below the safety factor. This means that increased sensitivity is obtained at the expense of permanence of magnetic field.

The angle of each pole arc is generally not made too great, for then there would be introduced additional losses in the gap intensity, owing to magnetic dispersion of the pole tips.

When a current is sent through the coil a deflecting force is produced, and as the movement is pivoted at each end, and rests in jewelled bearings, the movement then tries to rotate, but this rotation is resisted by the spiral springs that are fitted both top and bottom.

THE SPRINGS

Both of these springs have their inner ends attached to the movement and their outer ends fixed to a firm stationery support—therefore, when the movement starts to rotate, due to the deflecting force set up by the current flowing through the coil, the pointer which is also attached to the movement starts to read up scale, and the springs begin to wind up more and more, so that eventually the pointer comes to rest.

When this position has been reached it is clear that the moment of torque of the deflecting force is equal in amount and opposite in direction to that of the opposing torque due to the springs.

When the current is cut off, the force produced by the spring will restore the movement to its original zero position, and it therefore may be called the restoring force.

The moment of the force produced by the springs is directly proportional to the extent to which the springs are wound up, so therefore the restoring force is proportional to the angular deflection.

When the pointer comes to rest the deflecting and restoring forces are equal to each other, and therefore the moment of the deflecting force is proportional to the angular deflection.

PHOSPHOR-BRONZE SPRINGS

The springs used in meters are mostly of phosphor bronze and are what is known as the spiral type. They are generally designed to have a large number of turns, so as to have as small a bending or deformation of a unit length of the spring as possible. While the cross sectional area is governed by the restoring force required.

The springs have to serve dual purposes in a meter, for first they have to supply the restoring force, and, secondarily, they are required to lead in and out the current to the movable coil.

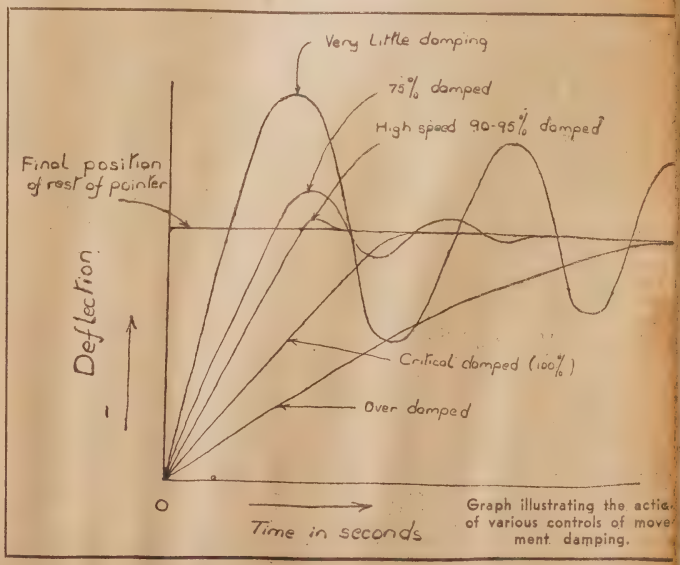
Springs have to be artificially aged before using by means of a mechanically or electronically operated dev to wind and unwind them at an aver temperature. This is really necess for a spring, if not so treated, may h what is known as elastic fatigue, wh shows up in the meter by the poin having a tendency to creep up the sc when the pointer is deflected for a c siderable time. Also the zero read is on the high side. Resetting the z adjustment in this case will not corr matters, for when the spring has b at rest for a while it will slowly retu to its original zero position.

The purpose of ageing the springs therefore to bring them to a perman state of elasticity. The sensitivity of meter is also governed by the sprin for by using springs of low torsion, l current is required to be passed throu the coil to reach the state of affa when the restoring torque of the sprin is exactly equal to the torque exerted the current flowing in the coil. The fore, the springs are of importance the final sensitivity of the meter.

TENSION

But it is not generally advisable

(Continued on Page 21)



Graph illustrating the actio of various controls of move ment damping.

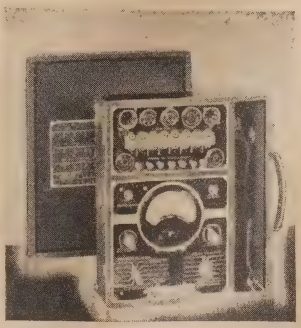
Helping Good Servicemen to do Better Work . . . .

PALEC

TEST EQUIPMENT AND METERS

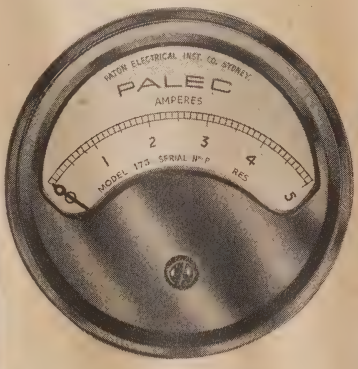
ODEL VCT
ALVE AND CIRCUIT TESTER.
pecifications and Features:
ALVE TESTING.—Shows the condition of
types of valves on the Good-Bad scale,
well as supplying a Neon test for
ement leakage.
OW OHMS.—A range of low ohms, read-
g from a tenth of an ohm (ten ohms
f scale) is provided for coil, contact,
d dry joint checks. OHMS.—Three other
nges supply measurements up to 10
egohms. ELECTROLYTIC CONDENSERS.
All types of Electrolytic Condensers can
tested and checked on a Good-Bad
ale.
APER CONDENSERS.—Paper and Mica
ondensers tested for open circuited con-
ections and leakage by the Neon flash
ethod.
A.'S—In four ranges to 250 M.A., D.C.
OLTS—In four ranges to 1000 volts, A.C.
OLTS—In four ranges to 1000 volts.
UTPUT VOLTS—In four ranges to 1000
olts.
he instrument is equipped with 5in. type
eter, having a linear scale for A.C. volt-
ge readings and is housed in a com-
act leatherette case, 11in. x 11in. x 7in.
eight 16lbs.
RADE PRICE (Plus Tax)—
odel V.C.T. A.C only £15/10/-
odel V.C.T. A.C.—Vibrator .. £17/17/-

THODE RAY OSCILLOGRAPH MODEL "CJ"
ite for details of latest models employing
special 902 type tube.



Palec Model "CM" Multi-tester, which measures D.C., A.C., and output volts, decibels, mills., ohms, and megohms capacity, inductance, impedance, and a.v.c. voltages. Price, £12 15/-, plus tax. Analyser Selector Unit, £2/15/- extra, plus tax.

Terms Available. Trade-ins accepted. Write for our *NEW 16 Page Catalogue.*



PALEC METERS

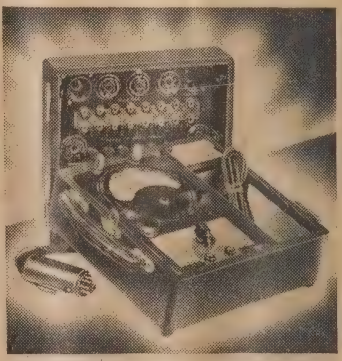
Above is illustrated the Model "475," a 5in. type meter, particularly suitable for bench work and panel mounting.
Palec Meters are made in the popular 3in. size and 5in. size with the convex face. Flush mounted and projection types are also available.

TEST OSCILLATORS!
Battery and A.C. Operated.

SPECIFICATIONS: VERNIER DIRECT READING DIAL, calibrated in kilocycles and metres. (No Charts.) The five ranges take in all the commercial bands between 150 k.c. and 16,000 k.c. (2000-19 metres), while the second harmonic of band five provides a strong signal down to 32,000 k.c. for future requirements.

ATTENUATION: The most outstanding feature of the Model "DR" and "DE" is their attenuation capabilities on all bands. Cast aluminium coil and attenuator cases, together with correct Signal Generator design, has reduced the minimum leakage ACTUALLY to below 1 microvolt. It enables the operator to align the most sensitive set without disturbing the A.V.C., for in no other way can perfect aligment be achieved.

MODEL DR: Price £10/15/-, Plus Tax.
MODEL DE: Price £11/15/-, Plus Tax.
Both Models are readily portable, measusing only 7½in. x 9in. x 6in.



VOLT-OHM-MILLIAMMETER MODEL "M5"

A reliable and accurate multi-range instrument equipped with our large 5in. meter. Trade Price, from £5/17/6, Plus Tax.

PATON ELECTRICAL PROPRIETARY LTD.

90 VICTORIA STREET, ASHFIELD, SYDNEY.
'Phones: UA1960-1982.

DISTRIBUTORS:

Sydney: Leading Distributors.

elbourne: Lawrence and Hanson Electrical Co., Ltd.
omecrafts, Ltd., 211 Swanston Street, Melbourne.

DISTRIBUTORS:

Brisbane: Lawrence and Hanson Electrical Co., Ltd.
Adelaide: Newton, McLaren, Ltd.
New Zealand: The Electric Lamp House, Ltd., Wellington.
Perth: Carlyle and Co.

THE MOVING-COIL METER

(Continued from Page 19.)

the springs to be too weak, for other factors arise that affect the speed of operation, &c. For instance, the weight efficiency of a meter is very important, for it plays a very big part in the period of the movement. This weight efficiency is obtained by dividing the total weight of movement in grams into the torque of the springs in dyne cm.'s. This varies from 20 up to about 400 or so dyne cm.'s per grm. The higher the figure, the faster is the movement.

DAMPING

Again, the damping is increased for a given size and thickness of former by the use of lighter springs, thus causing loss of speed and promptitude of reading. This, in conjunction with a low weight efficiency, would result in a very sluggish meter.

The purpose of damping in a meter is (1) to bring the pointer of the meter to its final position as quickly as possible when the pointer is deflected by the current being measured; (2) to prevent damage to the pointer and movement by providing a cushioning effect; (3) also to prevent the building up of oscillations when the current varies, and thus allow of quick readings being taken.

When the pointer reaches its final position without going past this point, the movement is then said to be dead-beat, or aperiodic; this is called critical damping or 100 per cent. damped. If the damping is increased still further we have what is known as over-damping. Here the pointer still does not overshoot its final position, but the movement is sluggish and takes time to reach its final position.

In the case of under-damping the pointer actually goes past its final position of rest, then comes back past this point, or, to be exact, oscillates to and fro past its final position, the amount of oscillation depending on the amount of damping. The usual method is to slightly under-damp the movement, then the movement is fast and will only overshoot a little and then come to rest quickly.

DAMPING METHODS

To explain the above better, a graph has been drawn showing the difference between various degrees of damping.

In moving coil meters the damping is obtained by winding the coil on an aluminium former, so that when this former begins to turn, the sides of this former that are parallel to the spindle cut the flux in the air gap, with the result that a current is induced in each of the sides of the former. These currents act in opposite senses to each other, and as the flux is radial, and therefore has the same density in any one part of the air gap, the current is therefore proportional to the number of lines cut per second. Also, the current is proportional to the speed. As the former is a closed circuit, the current, therefore, flows around it. This current in the former produces a torque or thrust the same as the current flowing through the coil does, excepting that it is opposite in its direction, and, therefore, opposes the motion of the coil. It is, therefore, called a damping torque and will die out when the motion ceases because the induced currents also die out. This type of damping is known as Eddy current damping.

In shunted current meters, it is not advisable to have critical damping of the movement, for the shunt across the meter is generally of a very low resistance and thus will cause a closed circuit of low resistance across the coil, which will also add to the damping, and thus tend to cause over-damping of the movement. Meters of this class are, therefore, usually designed to give about 80 per cent. damping without the shunt connected.

The moving coil of a meter is always wound with a gauge of wire that will give the required resistance of coil, and current carrying capacity. The actual number of turns of wire that is required to give a certain current sensitivity is fixed solely by the dimensions of the coil, the air gap intensity and the torque of the springs it is desired to use, and is given by the following equation.

Turns—10 Tk over ILbB.

Where Tk—Torque of springs in dyne cms.

L—Length of coil former in cms.

b—Width of coil former in cms.

B—Induction density in gausses.

I—Full scale deflection in amperes.

All moving coil meters are always made in either the milliampere or the micro-ampere type, irrespective of whether they are intended to read amperes or volts.

In ampmeters the resistance of the coil and the current required for full-scale deflection is generally made to give a IR drop of between 50 to 100 millivolts across the meter terminals, and then shunted to give the required scale readings in amperes.

In the case of voltmeters a series resistance is used instead of a shunt. Therefore, an ampmeter or a voltmeter are exactly the same meter as far as the movement is concerned.

Finally, a point in regard to the accuracy of measurements with a meter.

In using any kind of indicating instrument, the actual accuracy of any readings taken can never be any more accurate than the accuracy of the indicator. In actual practise, though, any measurements that are taken with a meter are seldom as accurate as the meter's accuracy is.

For in every case where any measurements are taken, irrespective of what their measurements are of, the final deciding factor rests on how the actual result was taken and what factors, if any, were neglected. Taking a very simple case of measuring the current flowing in any closed circuit by the insertion of a current reading meter. Now, the meter indicates the current flowing in this circuit, but, at the same time, it introduces an error that is not its own, but actually the added resistance it gives to the circuit by the introduction of its own resistance to this same circuit.

An elementary

COURSE IN RADIO

for beginners

Being a very elementary course of Radio study for those who wish to know "what makes the wheels go round."

By L. B. GRAHAM, Principal of the Australian Radio College, Pty.,

OME ELECTRICAL QUANTITIES

URRENTS which alternate or change their direction of flow millions of times in one second are very hard to control. We find difficulty in making them do just t we want them to, and in keeping m in their proper place. Insulation, means of which direct current is t in place, will quite often allow h frequency currents to act through lmost as though it were not present.

CTRICAL OPPOSITION

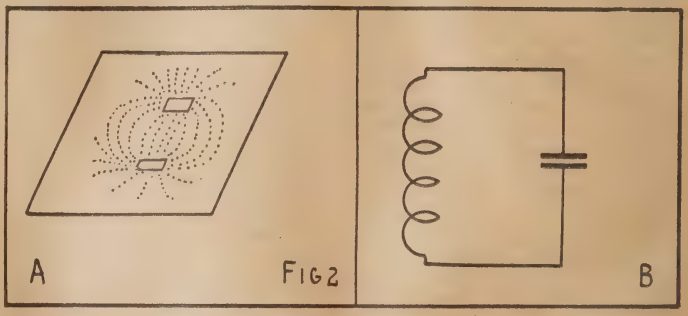
here are three forms of opposition electrical current flow, "resistance," actance," and "impedance." These es are used very extensively in the C ke-up of a modern radio receiver.

esistance to electricity is the ivalent to friction in mechanics. If bearing of a wheel becomes dry, wheel becomes hard to turn, and orced around will make the bearing This heating effect is due to the tion between the dry surfaces of axle and the bearing. It requires of effort to turn the wheel, and of that effort is wasted in the generated in the bearing.

imilarly, resistance offers an oppo- on which requires electrical effort overcome it, and this effort is lost heat generated.

esistance is present to a varying degree in anything through which electrical current is passing. It is impossible to eliminate it altogether, although by careful construction, &c., it may be reduced to a very low value.

Resistance in some form or other plays a tremendously important part in modern receiver design. In some cases it is unwanted, and we go to a lot of trouble to reduce it to a minimum. In other cases we use it liberally as a method of controlling voltage and current, and in such application it is indispensable.



Iron filings when scattered on paper covering the ends of a magnet, will trace out the lines of force. (B) shows a circuit including inductance and capacity.

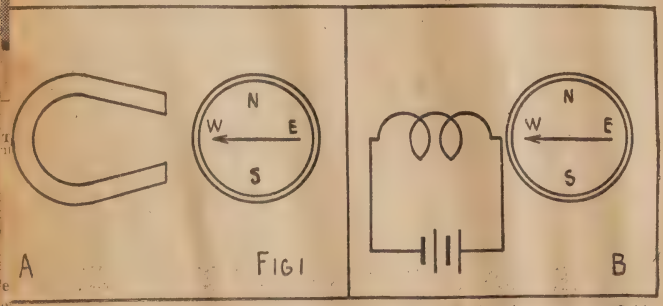
REACTANCE

Reactance, although an opposition to alternating current, bears no further resemblance to resistance.

It is the property of coils and condensers which allows them to perform their necessary work, and is present only when alternating current is applied. There is no such thing as reactive opposition to steady direct current. Resistance, however, opposes both alternating and direct current in the same way.

Reactance, although being an opposition to the flow of alternating current, does not waste energy in producing heat. It takes energy from the circuit, but returns it. No energy is used in the process due to reactance, but as it is impossible to eliminate all resistance, some energy will be converted to heat by the resistance present in a circuit. An analogy illustrating this would be a compressed spring, considerable effort may be required to compress a spring, but the spring will return that energy in some form or other when released.

The type of opposition known as "impedance" consists of a combination of both reactance and resistance in a circuit.



howing how the needle will be deflected by a magnet, or by the magnetic field surrounding a coil.

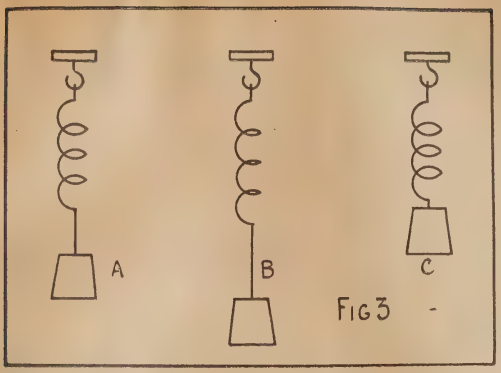


FIG 3

This diagram illustrates the spring analogy referred to in the article.

LINES OF FORCE

To understand more of reactance, it is necessary to know something of lines of force. You are probably familiar with the action of magnets and their ability to attract pieces of iron and steel. As an example, a compass needle will turn towards a magnet when held near it. This ability is due to the magnetic lines of force which exist around a magnet. These lines of force are, of course, invisible, but they possess the ability to attract any iron or steel object. In other words, they are able to do work.

Similarly, a coil through which a current is passing sets up lines of force which will also attract any iron or steel object. An interesting experiment which may be carried out quite simply is to place a thin piece of paper on top of a magnet and sprinkle the paper with iron filings. The filings will form in lines which mark the direction and form of the magnetic field around the magnet.

A coil which has a flow of current through it sets up a field of lines of force. When the current through the coil is changing, as it is continually with alternating current, this field will rise out from and collapse back into the coil in sympathy with the changes of current. The rising and falling of this field produces voltage in the coil.

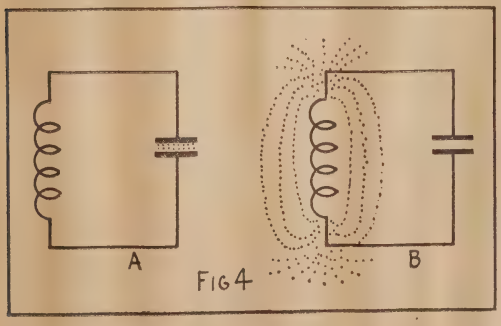


FIG 4

Diagram illustrating the charge of the condenser, and the lines of force built up round the coil which maintain an oscillating action.

OPPOSES FLOW OF CURRENT

The effect of this voltage generated is similar to inertia, that is, that it opposes the flow of current when the current starts, but returns energy when the current is stopping and tries to keep it moving. The voltage generated, or as it is called the "counter electromotive force," gives the coil the property of reactance.

More will be said about the generation of counter electromotive force in later articles. It is sufficient for the present to know that the field of force which rises from and falls back into a coil, when alternating current is passing through it, gives the coil the property of reactance by generating the counter electromotive force.

A condenser is one of the simplest of electrical devices, consisting merely of two plates of a conducting material separated by an insulating material which is termed the dielectric. Although the condenser is such a simple device, its action is one of the most difficult things to understand that you are likely to strike in radio work, and will consequently not be dealt with fully until a later article.

When a voltage is applied to a condenser, current will flow into the condenser plates and the condenser becomes charged with electricity. The condenser has stored a certain amount of electrical energy which it can return when required. This action is again due to lines of force, but this time electrostatic lines of force, acting on the dielectric material and placing it under an electrical strain.

It requires electrical effort or energy to charge the condenser, but this energy is returned when the condenser discharges. A condenser then has the ability to act or it possesses the property of resist

A very strange thing about the r ance of coil and condenser is that placed in a circuit together, inste adding and providing an incr opposition to alternating current they subtract from each other and vide lower opposition. If we ta coil of certain reactance and pla in the circuit with a condenser of ex the same reactance, the two react will cancel, leaving no opposition i circuit, except the resistance of various parts, which, of course, ca be entirely eliminated. It is this str occurrence which enables us to a receiver to the station we desire t aid of two simple componen coil and condenser.

OSCILLATORY CIRCUITS

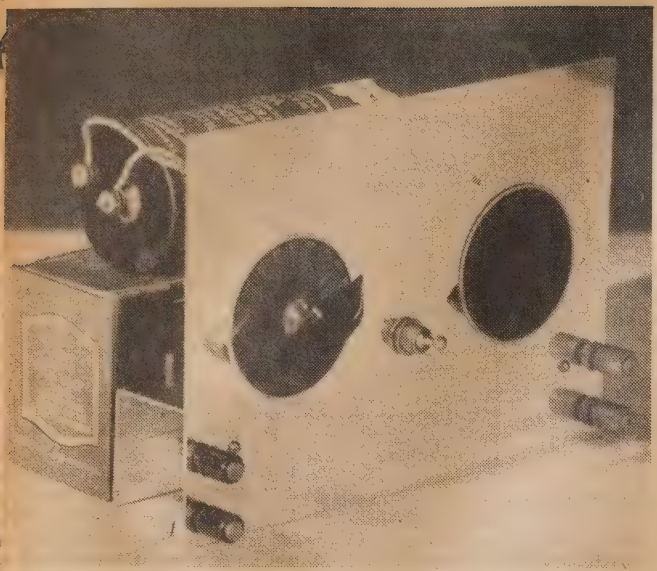
To illustrate the action of an latory circuit which consists of a and condenser connected as in F we can use the analogy of a w attached to a spring (Fig. 3). If weight is pulled downward, the s will stretch, and being stretched exert more effort, when the weig released the spring would pull weight higher up than its normal tion. The weight would then stretching the spring again. This a would continue with the effort or e first being exerted by the spring, then the weight, until the energy used up in overcoming the frictio the moving parts.

If the coil and condenser are su tuted for the spring and weight re tively, we will have somewhat the action electrically as we had in mechanical action of weight and sp

Fig. 4A represents a condenser w has been charged, and therefore tains energy in the strained diele The difference in voltage between two plates of the condenser will a current to flow from one plate o condenser to the other through the The movement of current through coil produces a field of lines of f When the voltage difference bet the two plates of the condenser appears the current naturally tri cease flowing, but the falling line force tend to keep the current m and the condenser is forced to ta charge in the opposite direction t original charge. When all the e contained in the field of force ar the coil has been expended in cha the condenser, the condenser will to discharge again, and the operation is repeated in the re direction.

This action will continue, the e being alternately stored in the denser dielectric and the coil's fie force, until all the energy is los heat generated by the passage of oscillating current through the cir resistance.

In the next issue we will deal briefly with the broadcasting sy before returning to the elementary ciples involved in receivers.



front view of the receiver, as it would appear with the cabinet removed. Don't forget to switch it off when you are finished listening.

side view, which shows exactly how the batteries are packed in. The chassis is just the same as that used for the original receiver.

Introducing

HERE is a self-contained transportable receiver which is light to carry and economical in operation. It employs one valve, and is suitable only for use with headphones, but presents exceptional value for a modest cost.

Even if you already possess a powerful receiver, you will find plenty of use for "Little Jim's Mate."

The operating cost of a modern battery receiver is quite an item, and there must be hundreds of people who need radio news and entertainment, but who find that they cannot afford to purchase and operate a normal type of battery receiver. This little set will appeal to these people, too, for it can be built cheaply, and overall running cost should not exceed about ten shillings a year, or less than 3d per week.

Only a crystal set can hope to be more economical, but when it comes to performance it is found that a set of this type is miles ahead of a crystal set. This is especially noticeable in regard to both sensitivity and selectivity.

"Little Jim's Mate" should have no difficulty in bringing in stations over distances of a hundred miles and more than enough selectivity to separate powerful local stations in all except the most difficult locations.

A STORY

There is quite a story around the design of the original receiver shown in the photographs. It was built as a present for an old friend who lives in the country, several miles from the nearest township and quite out of touch.

This old fellow first tried a crystal set, but it just failed to give sufficient strength to make the news audible. Then he tried a second-hand battery set, but it soon proved itself far too expensive for a somewhat limited purse. A couple of "blown" valves and then a call for a set of replacement batteries put it out of action.

Appreciating a kindness of several years ago, we decided to see what could be done for the old chap. A little thought on the problem resulted in this set being built. We feel sure that it is going to give him just the reception he wants, and it should run for at least twelve months without attention or expense.

Building it up was a pleasant way of spending the evening, and the little

"LITTLE JIM'S MATE"

entirely battery operated

We make no apologies for presenting this version of Little Jim, for operation entirely from batteries. There are dozens of our readers who have no A.C. power, and, who would like to try their hands at building a Little Jim for themselves. This version, therefore, is just what they want. Its performance is essentially the same as the original, the only difference being replacement of the "A" battery when it runs down. This, however, should not be for many months.

fiddling which we did with it when testing it out revealed that it has a charm of its own. Headphones, although cumbersome in a way, give a clarity and sweetness of reproduction which is difficult to achieve in even the most elaborate of big receivers.

APPLICATIONS

It is possible to imagine dozens of different applications for a set of this type. Take the case of the man in the road construction camp. He needs a set to keep him in touch with the world's activity, yet he must have a receiver which is readily transportable.

This set can be fitted into a packing case about 10in. x 7in. x 6in., and then it is only a matter of plugging in the headphones and throwing an aerial up to the bough of a tree. The batteries are contained inside the case. **There is not even an accumulator to be charged, to spill acid or get broken!**

LIMITATIONS

Naturally a set of such simple design and low cost must have its limitations. These should be fully appreciated by anyone contemplating the building of a receiver of this type.

First of all, it is no use expecting the set to drive a loud-speaker. It is specifically designed for use with headphones, and although several pairs of phones can be connected at the same time, there is no easy way of making the set suitable for loud-speaker work.

An aerial must be used. On this account, it is quite useless to expect to get results with the set when used on a bicycle, motor-bike or in a car. A fairly decent aerial is absolutely essential and an efficient earthing system highly desirable. These arrangements can be carried out quite readily in a normal household installation or in a camp, but are impracticable in mobile installations of the type just mentioned.

THE CIRCUIT

The circuit used is the logical application of the original "Little Jim" scheme. This provides for the use of a twin type of valve as two separate units and gives the same effective performance as any ordinary two-valve set. A 19 type valve is used with the filament heated from a single "A" cell, in place of the A.C. operated heater of the original "Little Jim."

FILAMENT VOLTAGE

The type of valve used is originally intended to operate with a filament voltage of 2 volts, but the "A" cell we use delivers only about 1.5 volts. At a glance, this would appear to be a difficulty, but in practice it presents no problem at all. The filament of the 19 is designed to emit a very heavy stream of electrons when in normal use as a class B output valve, but in this circuit an infinitesimal emission is sufficient, the actual plate current passed by the valve being n below normal with the 45 volts of tension used. As a result, it is foun practice that the 19 can be used in circuit to give complete satisfaction w operating from the single "A" cell. filament current drain is about 200 n amperes.

PARTS LIST

1 Base, 8½ x 2½ x 2.
1 Panel, 9½ x 6½.
1 Tuning condenser.
1 Coil to suit.
1 23-plate reaction condenser.
1 Radio frequency choke.
1 2-megohm resistor.
1 1-megohm resistor.
1 50,000 ohm resistor.
2 0001 mfd. mica condensers.
1 .00005 mfd. mica condenser.
1 6-pin socket.
4 Insulated terminals.
2 Knobs.
1 Switch.
1 Valve, type 19.
1 Pair headphones.
1 "A" dry cell.
1 45v. light duty "B" battery.

IMMEDIATE RESULTS

When we built up this set we imag that we might strike some minor wo with the usual difficulties, such as mo boating or fierce reaction. But, a happened, the little set gave immed results as soon as finished and no adj ment or attention of any kind was fo necessary. This was due in no s measure to the use of the special coil which was developed for the orig "Little Jim."

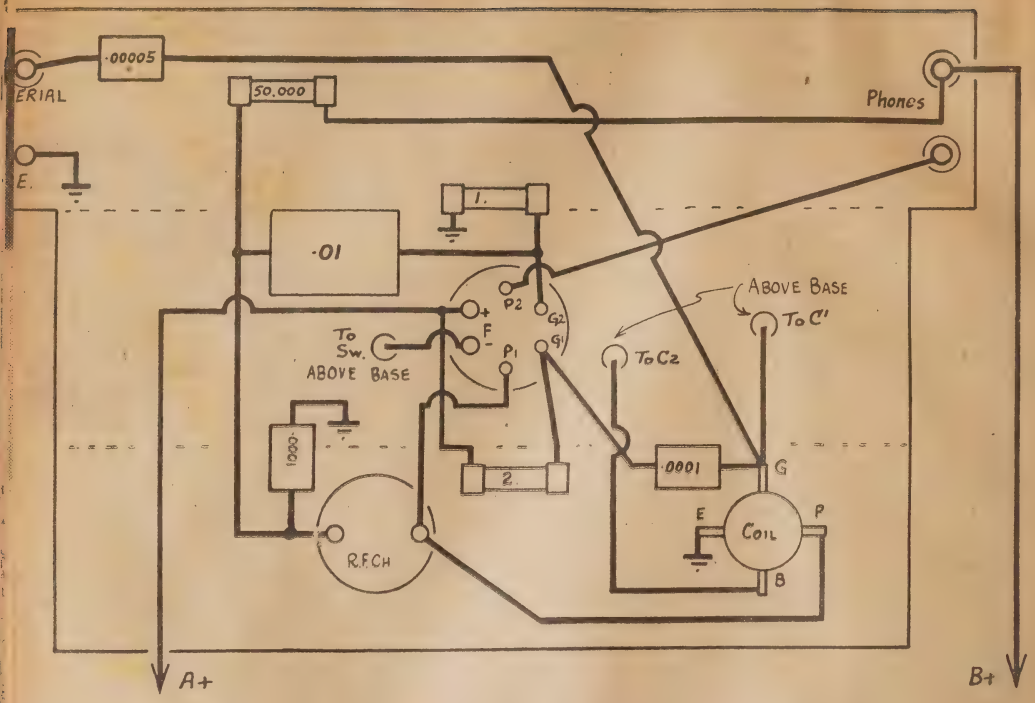
This coil unit, which is quite ur the old-style coils, and resembles a l of sticky lolly, is a most efficient u using latest coil winding principles. cannot be duplicated at home, but is not a drawback, as coils for the are available at 3/6 retail. This pri not excessive as they are multi-l honeycomb windings, using high-ef ency "Litz" wire, totally impregnated sealed in a humidity-resisting compo

They are available in R.C.S., Radio and Crown brands.

CONSTRUCTION

The chassis of the set is designe fit alongside the "B" battery and the cell, so that the whole job becom self-contained unit and then fits a small box. This means that it is and narrow, as will be seen from illustrations. The chassis is the s as used for the original "Little J and ready-drilled bases are rea available from any of the radio s stocking component parts.

The actual construction of the amounts to the assembly of the p a very simple task, and then a littl of soldering for the wiring up. calls for more care and skill, but is beyond the ability of any handy m



Here is the wiring diagram, drawn as though the chassis were laid out flat. It is very simple and easy to follow.

SEMBLY

irst step in the assembly is to fit tuning condenser, first attaching a to the insulated terminal at the om of the condenser and running lead through to the bottom of the through a suitable hole. The conser framework should bolt firmly to metal base, and, if a painted base, quate precautions taken to ensure efficient earth return between the denser frame and other "earthed" nections.

ext step is to fit the valve socket then the rest of the smaller parts be fitted and wired into place acding to the circuit. The coil unit uld be fitted last, and great care uld be taken to see that the windare not damaged or the impregnawax melted by the careless applion of heat from the soldering iron.

NNECTING THE BATTERIES

reat care must be taken when conting the batteries, to make sure that leads from the filament do not come contact with the high-tension bat-. Only the lightest contact with the ninals may mean complete ruinaof the valve. Valves are too exsive to be burnt up in this way. e find that the best plan is to at- the "A" cell first, not bringing the "B" battery near the set until the filament has been lighted.

THE SWITCH

The switch can be fitted between the filament negative and earth, as shown in the picture diagram and in the photographs of the original set, or it can be fitted in the "A" negative lead between the cell and earth, as shown in the circuit diagram. There is nothing to choose between the alternatives, **but under no circumstances should the switch be fitted in the "B" negative lead as well as in the "A" lead,** for under such circumstances it becomes possible to burn out the valve filament even when the switch is in the "off" position.

OPERATION

As with all sets using reaction, the effectiveness of the set is largely tied up in the operation of the reaction. Given sweet reaction and intelligent use of the reaction condenser, it is possible to get almost unlimited range and selectivity.

Incorrect use of the reaction control will result in interference being caused to nearby receivers and poor results will be obtained.

Normally the set should be tuned with both hands, one for the station tuner and the other for the reaction control.

The reaction control can be used just like a volume control, but when advanced too far the set will plop into a state of oscillation, and it is just a fraction of a turn back from this point where best results are to be had. The exact position will vary with different stations and with different aerials.

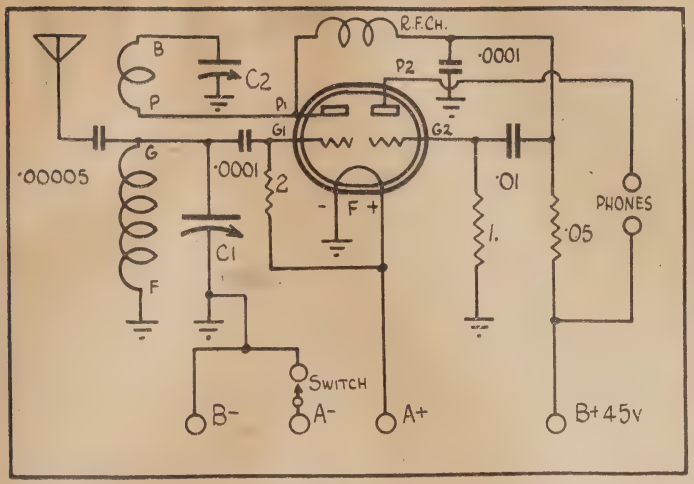
AERIALS

Quite a large aerial can be used with the set as described, the .00005 mfd. fixed condenser in the aerial circuit allowing this without difficulty.

If a smaller aerial is to be used, this condenser may be omitted, or experiments carried out with condensers of .0001, .00025, or .0005 mfds. In fact, quite a good scheme is to use a small variable condenser or an old tuning condenser in this position. It can be adjusted to give best results with the particular aerial being used.

ADDING VALVES

It is quite possible to add another valve, such as a pentode output valve, to make loud-speaker results possible. This will mean getting away from the original idea of the set, and a suitable two-volt accumulation will be essential for lighting the filaments.



The circuit of the receiver shows little change from the original, except in the filament connections.

THE VALVE

You may wonder why we have not used a 1.4 volt type valve instead of the 2-volter, now that 1.4 volt valves are on the market.

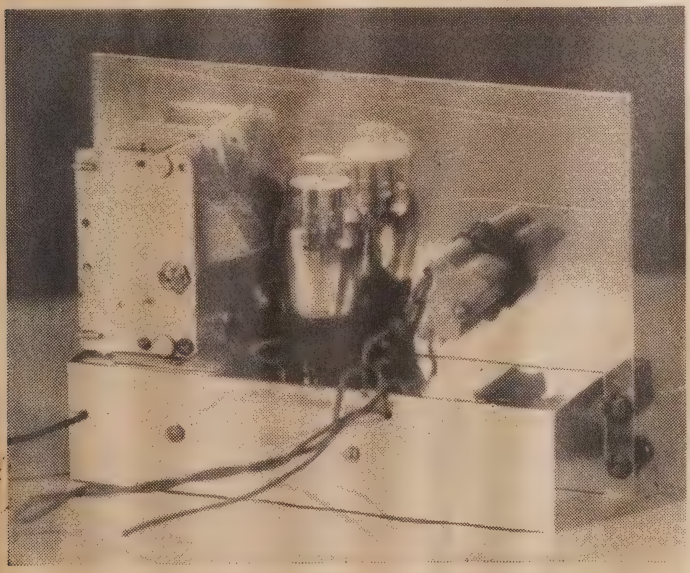
The reason is that, so far, there is no equivalent valve in Australia of the 1.4 volt type, although such valves have been announced in America. No doubt they will be here in time, but their only advantage would be a saving in the A battery drain. Actual results we do not think would be any better.

While on this point, the 1J6G can also be used in this set, and it has a very slight advantage over the 19 in that the filament only draws .24 amps instead of .26, or 2 volts.

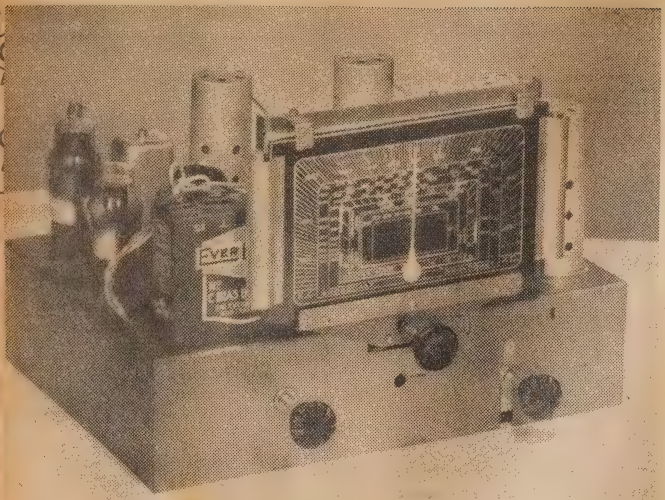
However, with 1¼ volts only on the filament, the drain will of course be less than this rating for 2 volts, and therefore we don't expect any noticeable difference between the two. The 1J6G has an octal base.

WATCH THE SWITCH

One word of warning. The original Little Jim could be left on all night if you desired, as the running costs were so low, and the filament A.C. operated. However, his mate uses a battery for the filament supply, and if you leave it on all night, that's so many less hours' running you will get from it in the daytime.



Another view of the chassis with the batteries removed.

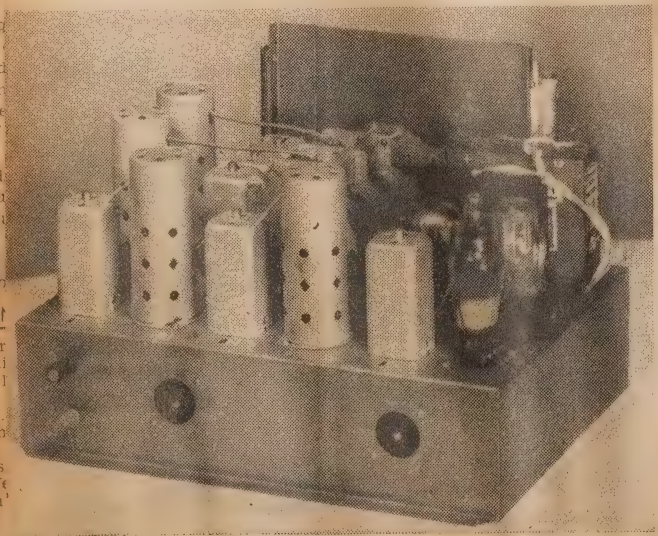


A FRONT VIEW

his is the receiver from the front. Connections running through the chassis to the battery are seen here. The battery fits behind the dial and in front of the B class transformer, which is also seen in this picture.

A REAR VIEW

urther details of the set are made clear by this picture. Note the three inter-ediate transformers which are required for the two stages. The valve on the xtreme right is the output valve. The coil unit is to the left centre beside the dial. Note the grid leads running across from the gang.



THE

FOR sheer performance, this is the best battery set we have ever built. In our day we have built quite a few. Who among you still remembers the Pentagrid Four, first four-valve battery superhet. to appear in Australia? And then the Pentagrid Sixes, improved Pentagrid Fours, up to the Master Six of last year?

Until we built this new seven-valver, the Master Six outperformed them all. It was a grand set, the Master. This new set is very similar in many ways, except that it uses a brand-new coil kit, and an extra intermediate stage.

We had the urge to build this set from two sources.

STEREOSCOPICS !

The first of these was the fact that we have been receiving a number of letters from people talking about stereoscopic reproduction with battery sets. We have even printed letters from one or two who have tried out the idea, and found it successful. And why not? Given a set with good output, and a pair of decent speakers, such as one can buy these days, there is no reason why the idea cannot be put into operation quite easily.

The second urge was the sight of the chassis on which we built last month's Economy Six. That set was built for a very different purpose, but the chassis and most of the parts were simply itching to be used before the set itself was pulled to pieces and consigned to the pages of history.

A really big battery set! Only one extra hole to be punched in the chassis for the B class output valve, and here was a grand seven valve set, with two intermediate stages, just waiting to be knocked together.

No sooner said than done. A few minutes working on a circuit with pencil and paper, and we evolved about the simplest hook-up we could think of for seven valves. The factory technician will probably frown on one or two points, we admit. Half-a-dozen resistors undoubtedly could be added which would make the circuit proof against one or two snags which probably will never crop up anyhow.

GREAT PERFORMER

Anyhow, the circuit we finished up with is exactly the same one you see drawn out here. It worked at the very first pop (after we had connected screen voltage to an I.F. valve which was missed out in our first run round!), and right from the jump proceeded to tune in what seemed to be every station on the band at full speaker strength.

We are only saying what is true, when we assert that it was with considerable difficulty that we decided which stations were locals and which were not. The "sock" contained in those

STEREOSCOPIC SEVE

battery receiver

Here is a big battery set which has proved itself to be a marvellous performer. Its high sensitivity makes it the last word when long-distance daylight reception is required. It has plenty of output, too, as it uses a B class amplifier for extra tone and volume. And as several readers have reported good results with a Stereoscopic system, we have tried it with this set, and found it excellent.

seven valves is simply amazing! This is the set you real D.X. hounds in the country have been looking for! If the Stereoscopic Seven can't play 'em, then nothing will!

SELECTIVITY AND SENSITIVITY

One can, of course, understand the sensitivity of the set. We have not compromised with battery drain in order to get our results. We have got sensitivity and how! and as we will point out in a moment, the battery current isn't as much as you would think. But for once we have used the valves we wanted to in order to get real gain. Any of you who have an idea of what modern coils and valves can do when an R.F. stage and two I.F.'s really get down to business, will understand what we mean.

The two I.F. stages, although we realised what they would do to the overall gain, weren't put there for that alone. The selectivity of the receiver is immensely improved because of them. If you have a set sensitive enough to tune in everything this side of, and including Mars, you want to make quite sure that it is IS Mars you are hearing, and not a mixture of two or three other planets!

As a result the station-splitting abilities of this Seven are better than any set you have used to date, unless you own a very, very hot one. Rotating the dial results in listening to an endless procession of them, split up with hair-line sharpness. Even those which are cutting each other's side-bands can be received in a kind of a way!

SHORT WAVES

The same thing, of course, is true on the shorts. Many of you are familiar with what the average Six can do on short waves. Well, think of the extra I..F stage, and you have the whole story. Turn up the gain, and they will pour in far louder than the speaker can take most of them.

STABILITY

The set, as we made it, was completely stable on both bands. One of the reasons for this is the use of simple A.V.C. With this system the valves never run quite down to their zero bias condition, for when flat out the noise level alone is enough to keep some bias on the controlled valves.

If you are a stickler for design, and shake your head because of a slight loss of maximum sensitivity, let us say now that if you can use all the gain this set can give you all the time you are better men then we are!

Should you be unlucky and strike intermediates with gain a bit higher than usual, it is a very simple matter to change over to another A.V.C. system using the extra diode for A.V.C. Then you can put any limiting bias you like on the A.V.C. line, to hold things down under that little bit extra gain which may mean I.F. oscillation. However, if we thought it necessary, we would have done this in the first place—we simply mention it in passing. It's only a matter of one extra condenser and resistor.

We haven't shirked anything in order to get our high gain. Every valve has been chosen to give the highest gain consistent with its own particular work. Which reminds us that, so far, we haven't said anything about the ci Let us take time off and run thr the set from beginning to end. howler intended!)

PARTS LIST

1 Base, 14 x 10 x 3½.
1 Dual-wave tuning box.
3 Intermediates, 465 k.c.
1 3-gang tuning condenser.
1 Suitable tuning dial.
1 .5 meg. potentiometer and switch.
1 1.5 meg. resistor.
1 1 meg. resistor.
2 .5 meg. resistors.
1 .25 meg. resistor.
1 .05 meg. resistor.
1 25,000 ohms resistor.
2 10,000 ohms resistors.
2 .5 mfds tubular condensers.
3 .1 mfds tubular condensers.
3 .05 mfds tubular condensers.
1 .02 mfds tubular condenser.
1 .0005 mfds mica condenser.
1 "B" class transformer.
Sockets—6 Octal, 1 4-pin, 2 5-pin.
Valves—3 1M5G, 1 1C7G, 1 1K7G, 1 1J6G, 1 B217.
Batteries—3 45-volt Superdyne B batteries.
1 4.5 volt C battery.
1 Heavy duty accumulator.
Speakers—See text.

THE CIRCUIT

The receiver has seven valves. T are made up as follows:—

An R.F. stage using a 1M5G.

A converter stage using a 1C7G.

Two intermediate stages using 1M5G's.

A duo-diode pentode second det the 1K7G, with one diode used for detection and A.V.C., and the pe as an audio amplifier.

A driver stage using a B217.

A "B" class output stage using a

The A.V.C. line controls the first valves. The second intermediate a fier is not controlled.

THE VALVES

The valves, as you will notice, ar 2-volt, .12 amp. types. These use A Battery than some others, but out doubt they give better gain are more reliable.

With all these sets we have desi for economy, we have pointed out we can't get something for not We can make very good sets economy valves, as last month's rec demonstrated so well. But we can better ones by using the valves you find in this set.

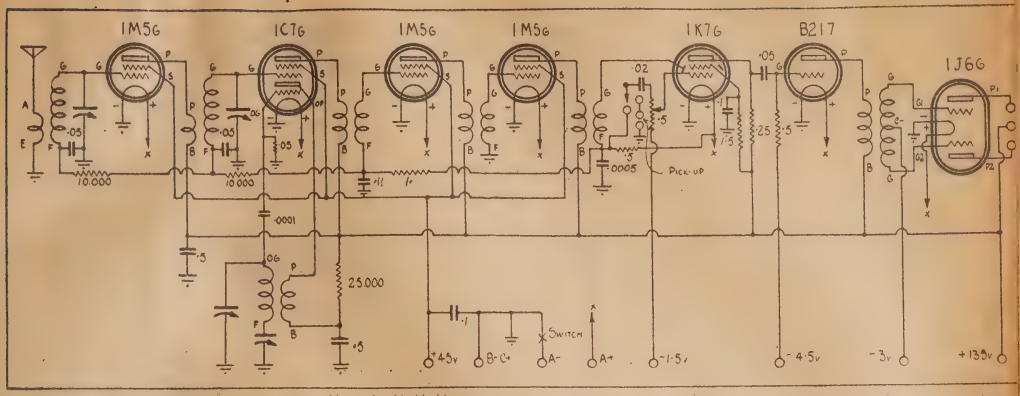
However, we believe that ever who makes this set will realise this and will be prepared to face the bit of A battery current they require

So we have used for R.F. ampl the 1M5G types, which are exactly same as the well-tried 1C4's, but octal bases. In fact, if some of have sharp eyes, you will see that R.F. amplifier actually is a 1C4, w we used because we didn't want to another 1M5G when we had a fectly good 1C4 on hand.

The 1C7G is the same as the 1C6 with an octal base. This again is best all-round converter, and easily best on short waves. It will ose well with almost any type of coi and has really excellent conversion.

The second detector, the 1K7G, is same as the 1K6 with the octal (Again we used a 1K6 we had on ha

The B217 we have found the triode driver, as it has a better than the 30 and needs only 4½ volts



The circuit shows that the set is really a very simple affair. Yet nothing has been omitted which should be there. The valves have been selected for maximum performance.

A 1K7G would do here just as well, used with triode connection (screen and plate tied together). But it needs a longer grid lead to the cap. It is a perfectly legitimate alternative, and results will be the same. The B217 has a little less filament drain. We could have used the PM1HL type here (B228), with still higher gain, but this valve is not as good a driver and the gain might possibly be too high, causing oscillation troubles.

The B class valve is the 1J6G, which is almost the same as the 19, but has a smaller filament drain. The 19, however, can be used as a direct alternative, bearing this in mind.

THE A.V.C. CIRCUIT

The lack of control on the second I.F. valve is standard practice, and is left that way to avoid overloading this valve when stray signals are being received. We are in favor of not controlling the converter as well, but in this set there might not be enough control if we left it off as well. There is no harm in trying it. Controlling the converter does cause slight frequency shift on fading signals on the short waves, but we find that when stations are fading as much as this they generally don't provide much entertainment, anyhow.

Series decoupling is used mainly to simplify wiring. With this coil kit (an R.C.S. type specially developed) it is very simple to wire up with this circuit.

VOLTAGES

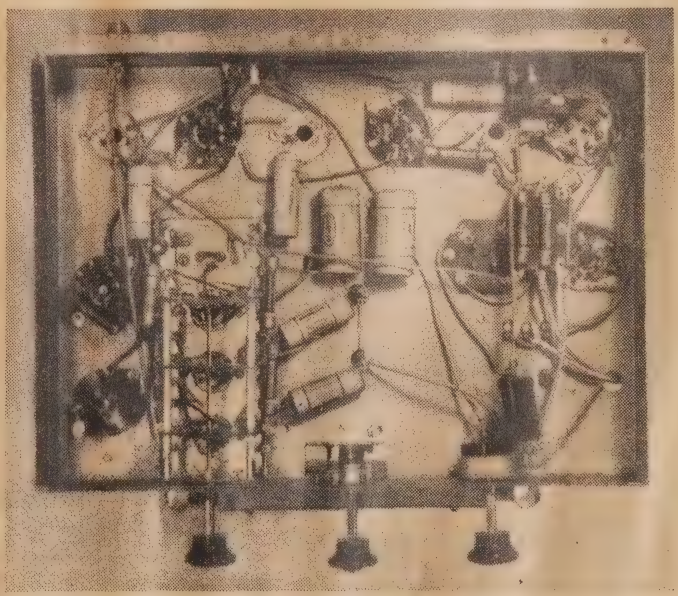
The set is designed to operate with 135 volts maximum high tension on the plates of all valves.

The screens of the first four valves are connected together, and you will probably find 45 volts is ample here for first class reception on broadcast and short waves. Increasing it to 67½ volts will give even more gain, but may lead to oscillation on the short waves, unless some limiting bias is placed on the A.V.C. line. Also the B battery drain will be increased by a few milliamps.

The oscillator plate voltage is obtained through a dropping resistor of 25,000 ohms. One could arrange for a switch to increase this to 50,000 ohms to save a milliamp or two on broadcast bands, but we don't think this is really wo while.

The C battery is placed above chassis, as is our usual custom, wh it tucks away behind the dial. There three tappings on it. The first of volts is used for the 1K6. The sec of 3 volts is used for the output v for best volume, and the 4½ volts for B217. The positive connection for battery we made to a solder lug bo down under a nut conveniently scre to the tuning dial. It simply has make good connection to the chassi

A good sized 2 volt accumulator is quired for the A battery. The t drain from it is .82 amps. Thus a tery of 120 amp. hours should give 100 hours of running, or nearly a mo at about 4 hours per day. A big batt of this type may charged at a gar with car batte without fear damage throu the rate being high. If you to use a big capacity batt (still 2 volts, course), there is harm in doing



A photograph taken of the actual receiver from beneath. Compare it with the wiring diagram, which has some of the small components moved round for clarity.

DRAIN FROM B BATTERIES

The B bat drain on local tions, with 135 v high tension, 45 volts screen, found to be 9½ mi with 3 volts bias the output va With no signal, drain rose to mills.

On avera volume, the t drain will kick meter needle up about 13 mills., more than this course, on l volume.

R·C·S

New 1939

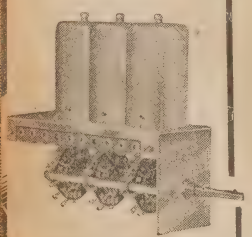
TROLITUL COILS

R.C.S. TROLITUL TUNING COILS

R.C.S. new Trolitul Tuning Coils are highest Q. yet produced. Being wound on and supported by a combined Trolitul former and base, they lend themselves to an accuracy and precision hitherto unobtainable, resulting in highest efficiency ever obtained. All coils are suitable

DUAL WAVE COILS

B/C 1500 to 550 K.C. S.W. 16 to 50 metres.
Air Core Aerial Coil, 460 K.C. Cat. No. G19. Retail Price, 12/6.
Air Core R.F. Coil, 460 K.C. Cat. No. G20. Retail Price, 12/6.
Air Core Oscillator Coil, 460 K.C. Cat. No. G21. Retail Price, 12/6.



DUAL WAVE UNIT

B/C 1500 to 550 K.C. S/W 16 to 50 Metres.

Aerial, R.F., and Oscillator 460 K.C. A.C. Cat. No. DW24. Retail Price, £3/3/-.

Aerial, R.F., and Oscillator 460 K.C. Battery Cat. No. DW25. Retail Price, £3/3/-.

FOR THE SHORT WAVE THREE

Specify the New R.C.S. MC Type Midget Condenser. They are easy to gang. R.C.S. have designed a new Trolitul beat frequency Oscillator Coil to suit this receiver. Highest Q Coil made. Cat. No. F96.

RETAIL PRICE 11/9
Special High Gain Iron Core I.F.'s 10/6
15 mmfd. Midget Condenser, Cat. No. CV42 ... ... 6/6
50 mmfd. Midget Condenser, Cat. No. CV45 ... ... 8/-

FOR THE STEREOSCOPIC 7

The R.C.S. Kit for this new set comprises our new 1939 type Trolitul High Q Coils and Intermediates. The coils, which contain necessary B/C and S/W trimmers, together with 3 section wave change switch and padder, are mounted on a rigid steel bracket. The 3 I.F.'s are iron core for better quality, selectivity, and stability under all conditions.

Stereoscopic 7 D/W Coil Kit. Cat. No. K102.
RETAIL PRICE £3/3/-
Special Iron I.F.'s for K102. Retail Price, 10/6.

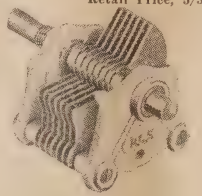
"LITTLE JIM'S MATE" TUNING COIL

Specially designed for and used in this set.
Extremely High Gain and Selective.

"Little Jim's Mate" Tuning Coil, Cat. No. K80.
Retail Price, 3/6 Post Paid.
"Little Jim's" R.F. Choke, Cat. No. RF2.
Retail Price, 1/- Post Paid.
"Little Jim's" Midget Condenser, Cat. No. CV40.
Retail Price, 5/3.

TROLITUL MIDGET CONDENSERS

R.C.S. Midget Condensers are made in two types, using Trolitul supports, thus guaranteeing practically no loss. The 14 plate equals old style 23 plate capacity. The M.C. type may be ganged.



STAR AND M.C. MIDGETS.

Max. Cap mmfds.	Min. Cap. mmfds.	Cap. Plates.	STAR Cat. No.	Price.	M.C. Cat. No.	Retail Price.
10	3	2	CV34	3/-	CV41	6/-
15	3	3	CV35	3/3	CV42	6/6
25	3.5	4	CV36	3/6	CV43	7/-
35	4	5	CV37	3/9	CV44	7/6
50	4	7	CV38	4/3	CV45	8/-
70	5	9	CV39	4/9	CV46	8/6
100	6	14	CV40	5/3	CV47	9/-

POTENTIOMETERS & RHEOSTATS

The R.C.S. volume controls are the result of improved and new methods of manufacture, together with alterations in design and final testing. Noiseless, they are constructed so as to cut off all volume.

6 ohm Rheostat	.25 amp	Cat. No.	PT40	.. ..	4/6
10 ,, ,,	.25 amp	,, ,,	PT38	.. ..	4/6
20 ,, ,,	.25 amp	,, ,,	PT39	.. ..	4/6
30 ,, ,,	.25 amp	,, ,,	PT34	.. ..	4/6
400 ,, Potentiometer	50 M/A	,, ,,	PT46	.. ..	4/6
1000 ,, ,,	35 M/A	,, ,,	PT47	.. ..	4/6
2500 ,, ,,	30 M/A	,, ,,	PT49	.. ..	4/6
5000 ,, ,,	30 M/A	,, ,,	PT51	.. ..	4/6
10000 ,, ,,	20 M/A	,, ,,	PT52	.. ..	4/6
15000 ,, ,,	20 M/A	,, ,,	PT33	.. ..	5/9
20000 ,, ,,	15 M/A	,, ,,	PT54	.. ..	6/-

R.C.S. TROLITUL BROADCAST COILS

Air Core Aerial Coils, 460 K.C. Cat. No. E282. Retail Price, 5/9 ea.
Air Core R.F. Coils, 460 K.C. Cat. No. E283. Retail Price, 5/9 ea.
Air Core Oscillator Coils, 460 K.C. Cat. No. E284. Retail Price, 5/9 ea.
Iron Core Aerial Coil, 460 K.C. Cat. No. E287. Retail Price, 7/- ea.
Iron Core R.F. Coils, 460 K.C. Cat. No. E288. Retail Price, 7/- ea.
Iron Core Oscillator Coil, 460 K.C. Cat. No. 289. Retail Price, 7/- ea.
Permeability Tuned Aerial Coil, 460 K.C. Cat. No. E279. Retail Price, 7/6 ea.
Permeability Tuned R.F. Coil, 460 K.C. Cat. No. E280. Retail Price, 7/6 ea.
Permeability Tuned Oscillator Coil, 460 K.C. Cat. No. E281. Retail Price, 7/6 ea.

TROLITUL INTERMEDIATE TRANSFORMERS

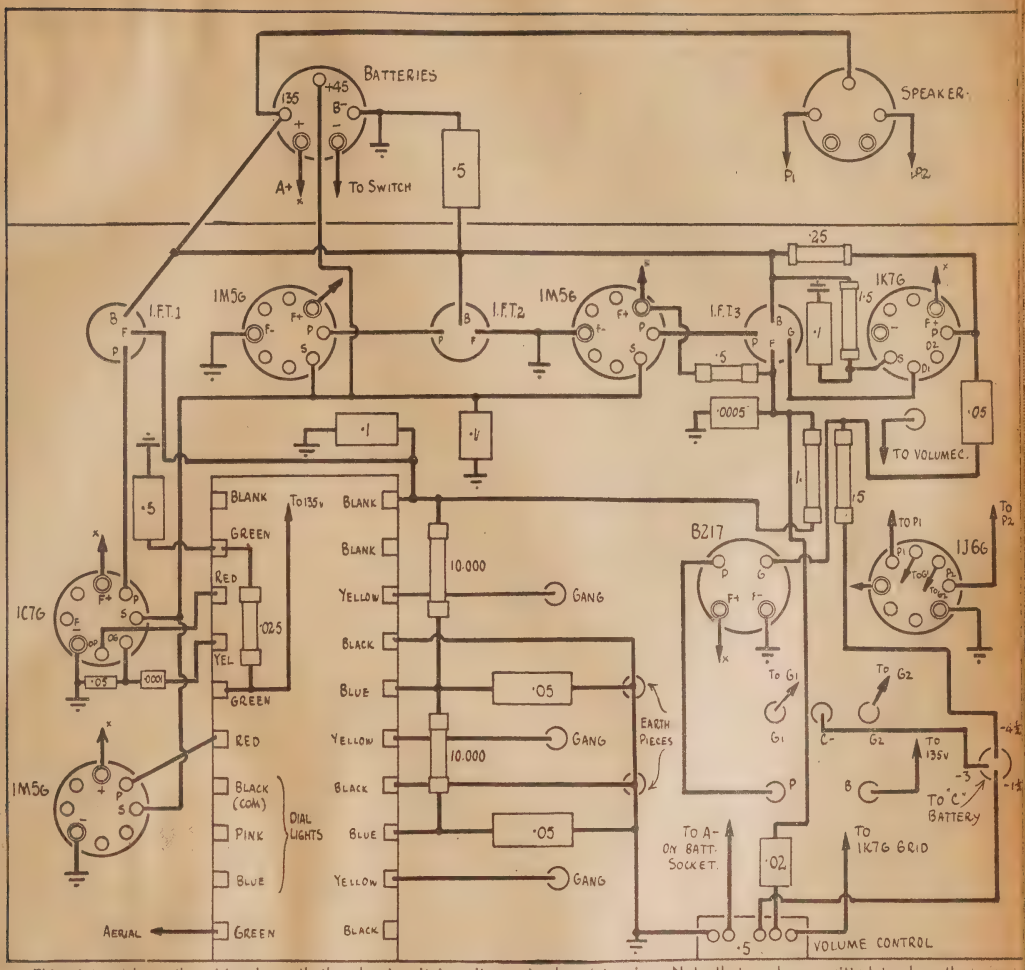
The new R.C.S. Trolitul I.F.'s are extremely stable, due to new method of construction, made possible by the use of Trolitul formers and base. No loose wires to shift and alter frequency. Positively the best I.F.'s yet produced.

Air Core, 1st, 460 K.C., sq. can, 3in. x 1 3-8in. Cat. No. IF107. Retail Price, 10/6.
Air Core, 2nd, 460 K.C., sq. can, 3in. x 1 3-8in. Cat. No. IF108. Retail Price, 10/6.
Iron Core, 1st, 460 K.C., sq. can, 3in. x 1 3-8in. Cat. No. IF109. Retail Price, 10/6.
Iron Core, 2nd, 460 K.C., sq. can, 3in. x 1 3-8in. Cat. No. IF110. Retail Price, 10/6.

Obtainable from your local dealer, or write direct to

R.C.S. RADIO PTY. LTD.

50 Glebe St., Glebe, Sydney. Phone, MW2405.



This picture shows the wiring beneath the chassis. It is quite a simple set to wire. Note that we have omitted to show the negative filament terminal of the 1K7G connected to the chassis as with the other valves.

VOLUME

On short waves, about 12 mills would be the standing current. Not so bad as you thought, is it? Under these circumstances the B battery life should not be less than normal with a big receiver, and if high volume is not used all the time, not much more than with a four-valve set.

With this set we advise the use of Superdyne batteries of the largest type, in three 45-volt units. Heavy duty batteries can be used, but the saving in first cost is not enough to balance the extra life you will get from the bigger ones. We used the large Ever-Ready batteries in our tests.

The C battery is an ordinary standard type, also an Ever-Ready.

If this set is to be used as a standard job, you will save a little B battery current by using the 4½ volt bias on the output valve. Under these circumstances you will be able to get the best part of 1 watt of distortionless output.

As we have intended it for use with a "Stereoscopic" set-up of speakers, however, and output comparable with an A.C. set, we suggest using 3 volt of bias, in order to get something like 1½ watts when required, with better tone.

If you use only 1½ volts, or none at all you can get 2 watts of output, but the battery drain tends to become rather high for the average man. Anyhow, most battery set builders know the ratings of B class valves by this time, without being told all this.

With a good B class transformer, the tone and volume of this set, working "flat out," will astonish you, if you have never used a big set before. It will be as good as the speaker you buy.

The use of such a highly selective circuit will result in a certain amount of high note loss, but this cannot be very well avoided. In the country, it is rather welcome, as an off-set to static which is generally about even at good times.

STEREOSCOPIC CONNECTION

You will no doubt remember articles on the "Stereoscopic Reproduction" system we developed last year. In brief, this system consists of using speakers, spaced about 10 feet apart the end of the room, one for the and middle registers, and the other the middle and high registers.

In order to eliminate most of higher notes from the first speaker, used various baffling schemes, wh prevented the high note output of first speaker being as noticeable as t from the second. The effect was to h the total sound from the entire sp between the two speakers, instead from a single source, as would be case with one speaker alone.

Particularly on orchestral items, idea is a marvellous improvement realism. It enables you to hear higher instruments such as the viol quite separate from the basses. It n

even allow you to hear the singer from one speaker, and the accompaniment from the other, if the accompaniment, as is usually the case, has a good percentage of lower notes.

STEREOSCOPIC CONNECTION

There is no reason why battery sets should not be as good in this connection as A.C. sets, particularly if the set has plenty of volume and tone, as has this seven-valver. At least one reader has built up the big horn for the bass speaker, in order to get good high note baffling, and low-note development. If you are keen on carpentering, try your hand at it.

The simplest way, of course, is to use a baffle board about three feet square for the low-note speaker, and to mount a V-shaped baffle, each side about one foot square, right in front of the cone, so that you are prevented from hearing the "beam" effect of the highs from this speaker.

The high-note speaker is fed from the same transformer as the low-note speaker, the two voice-coils being connected in parallel. The high-note speaker has a 25 or 50 mfds. electrolytic condenser connected in series with one of the leads to filter out most of the bass. It needs no baffle, or possibly only a small one to serve as a means of mounting. A small cabinet, as used for extension speakers, will suit. John Martin is one firm which can supply such small baffle cabinets.

TWO WINDINGS

A better way is to use a special speaker transformer with two secondaries, one for the low note, and a higher impedance one for the high-note speaker. Your dealer can supply such transformers, suitable for Rola speakers.

The cheapest way would be to use two 8/21 permagnetic speakers connected in this way. A better speaker for the lows would be the 8/42, which has a much bigger magnet, and is a particularly good speaker for the job. Both these are Rolas.

We would stress again that there is nothing to prevent you from using the set with a single speaker if you wish, and it will give you its fine performance just the same. For best results, we still prefer the plain three feet baffle, as against mounting the speaker in an ordinary cabinet. You'll get cleaner reproduction and freedom from cabinet "boom" by so doing.

CONSTRUCTION

There is very little to say about the construction of the set. Our wiring diagram is drawn to scale, and it makes everything clear.

The chassis measured 14 x 10 x 3½ inches. To mount the coil assembly, if you cut your own aluminium chassis you will need to slice out a section centred four inches from the right hand side, 1½ inches wide and 5½ inches deep to allow the coil cans of the unit to come through the top. A slot 1½ inches high and ½ inch wide is cut in the front of the chassis to accommodate the spindle.

The positions of the valve sockets, etc., are not critical to inch fractions, and may be estimated from the scale wiring diagram.

Wire and test the filament circuit first of all. We used a combination .5 meg. volume control and filament switch for convenience, although a separate switch can be used if desired.

Connections to the coil assembly are easy, and very short. The A.V.C. resistors and condensers are mounted directly to the lugs of the unit, and the blank lugs at the back can be used for solder points if required.

Make sure that all the grid and plate leads of the I.F. channel are as short as possible. Cut the grid leads above the chassis down as much as you can, and use good coil cans with a body and a top piece for most perfect shielding. 1K7G should also have a shield and the leads to the volume control should be shielded by using braided, hook-up wire. This is to guard against audio howls. There were none in the original set.

OPERATION

Having made sure all connections are O.K. and double-checked, connect up the C battery and then the A battery. Turn on the battery switch and see that the valves are alight. If you get the filament leads connected correctly first of all, you can't make a mistake, and connect them to the B battery! A simple but effective safety rule.

Now you can connect up the B batteries. It's a good plan to make each connection, starting with the 135-volt one, through a torch globe, for a start. Then if there should be a short circuit, nothing but a burnt-out bulb can be the result.

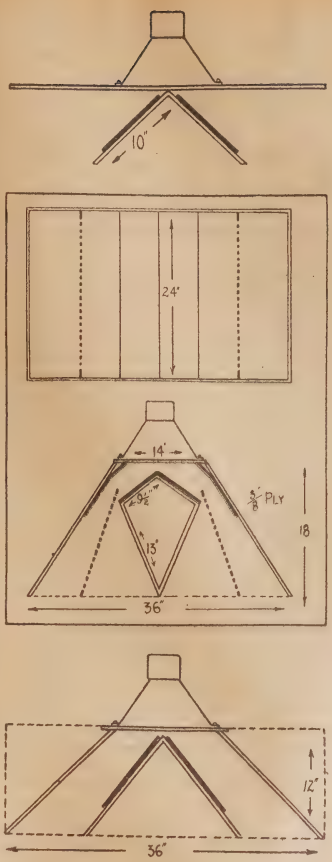
Assuming all is well, there will be a liveliness in the speaker, and you should tune in stations (with the aerial on, of course!). Find some strong station at the bottom end of the dial, and adjust the broadcast oscillator trimmer until it corresponds with its dial marking. Now adjust the other two until you get best volume.

Swing to a station at the opposite end, and without touching the trimmers on the coils adjust the padder, which you will find behind the coils at chassis level, until this station also is received at best volume. If all is well it should also be approximately or exactly at its right dial reading.

Now go back to the other end and make a final check on the trimmers until everything is "on the nose."

It is permissible now to make very slight adjustments to the intermediates to get the last ounce. Mark with a pencil the exact position of the slots on the adjusting screws before attempting to alter them, so you can come back to the original setting if you should get lost. Only the tiniest movement should be needed, if any, with the intermediates.

That's all there is to the set. You will find it the last word in sensitivity, selectivity, and tone. It is specially advised where extreme daylight reception is essential, and if you can't get it with this set you won't get it all.



Top: The simplest baffle for the low note speaker—a V-shaped plate in front of the cone. Centre: A large loading horn for best results. Bottom: An elaboration of the first idea, and a most effective one.

By using a combination of 6-volt 2-volt valves, and throwing battery sumption considerations to the wi we might be able to improve on performance of this receiver. But stands, we very much doubt whe it would be worth our while to In any case, it stands alone as simplest possible receiver to give the very maximum of battery perfo ance.

A.V.C. CONNECTION

Just as we were going to press noticed that in our circuit wiring gram we have connected the diode resistor for the LK7G across to positive leg of the filament instead the negative leg, or, in other wo to earth.

This is the usual connection for tection, which is probably why the occurred in the first place.

However, this connection means there will be a 2-volt positive bias plied to the A.V.C. line, theoretically least, when no signal is being recei The set will work quite all right way, but it may not be as stable a will be with this diode load connec direct to the chassis.

AERIAL AND EARTH

The set is very sensitive, and sh do well with only a small aerial. T however, is no excuse for neglecting aerial system. Give the set just good an aerial as you would any ot type. On local stations, you prob won't be able to tell the difference tween 10ft. of wire and 100ft., bu will show up when you are out a the D.X.

Here's good hunting and good with your Stereoscopic Seven!

BAD WEATHER AHEAD

WATCH YOUR ANTENNA

WINTER—and its approach should sound a note of warning to many of us. The rigorous weather during this season plays havoc with outside gear unless it is in good condition.

Amateur Notes by A. V. BENNETT

ERIALS, halyards, and masts especially need attention; it is very disconcerting to have one's aerial come down during an interesting chew, or at a moment when one is on the trail of some rare and elusive . Occurrences of this kind, you will ice, almost invariably happen on ingly cold, rainy evenings, when even thought of leaving the warm shack the seemingly sub-Arctic outdoors order to undertake repairs is sufficito daunt the hardiest of us.

In most cases rope halyards give reatest trouble. A good weight is eeded on the end of the rope, and ne good idea is to use an old win- ow sash weight in conjunction with piece of galvanised pipe or down- ubing as a guide—the tubing to be astened against the mast in such way as to allow free up-and-down ovement of the weight inside it. his will prevent the weight from ecoming entangled when the wet ope contracts.

preaders on the feeders also require ention. The usual type, of wax- pregnated wood, deteriorate during weather, and unless attended to be- e the arrival of cold, wet weather, liable to cause trouble. The use good glass spreaders is recommended. ese can be made quite inexpensively m three-eighth inch glass tubing, ich is procurable in short lengths can be cut to size. A clip made m 16-gauge sheet brass is suitable holding the feeders at the ends the tubing.

Having taken a few such simple pre- tions, one can be reasonably sure one's outside gear surviving the aver- Australian winter, damage by fire, htning, flood or tempest always ex- ted.

REATER USE OF LOWER EQUENCIES

Concerning conditions in general—80 tres has not changed much since t month's report. Listening on this nd gives one the impression that it is ZL-VK reservation. Some of the ZL ateurs are working North Americans phone.

t was interesting to note in March .T. that there is apparently a general ve to make the 160-metre and 80- tre bands more active, especially for

Good DX—G6WY, G2PL, SM6WL, F8RJ, and FA8BG are reported as being very active on 160 metres, and also a number of Americans. It would be interesting to hear from any VK amateurs who are using this band, and I should be glad to learn if overseas stations are being contacted. It is a point to bear in mind that unless these lower frequencies are used more often they may be lost to the commercial stations. This may be the thought behind the A.R.R.L.'s movement to encourage more general usage of low frequency bands, and, if so, co-operation from amateurs in this country would help.

READER'S OPINION ASKED

I would appreciate any opinions or ideas in connection with operating procedure and technique on the 160-metre band. With conditions on higher frequencies in their present unstable condition, it will be well worth our time to experiment more fully with 80 and 160 metres.

LISTEN FOR HIM!

AC4YN—ZONE 23

On January 7 of this year, I enjoyed a very fine business three-way q.s.o. with AC4YN and VK2AGH (Graham Hall), and what was more pleasing, a few days back 2AGH and I received qsl. cards from AC4YN. It was not one of those scratchy contacts, as Mr. Reg. Fox, AC4YN, was putting in a beautiful signal on 14,292 k.cs. Reports were exchanged, and Mr. Fox said that his location was 12,000 feet above sea level, and the temperature 12 degrees below zero. As this is a rather difficult zone to contact, I thought readers might be interested.

In Mr. Fox's letter to Mr. Hall, he promised to send along some photos, and I hope at a later date to obtain a loan of these from Mr. Hall, to reprint on this page. AC4YN operates on three frequencies—14,106, 14,157, and 14,292 k.cs., using an RK20 oscillator, working fundamental, which no doubt is a simple and easy c.w. transmitter. He operates around 7 p.m. to 11 p.m., our time, most evenings.

Incidentally, AC4YN is ex-VU2DR, and a friend of VU2FO, so if you hear VU2FO on, you may be able to make a schedule with him to contact AC4YN.

DISTURBED ATMOSPHERIC CONDITIONS

Undoubtedly 40 metres is improving, more especially during the mornings, when quite a number of consistent European signals can be heard and worked.

AMERICAN stations are constant during the evenings, but unfortunately atmospheric interference has been very severe lately, which makes c.w. operation rather difficult, and far from pleasant.

During the morning the ether is much clearer, and the local phone barrage has lifted, enabling one to operate c.w. in comparative comfort.

An improvement should soon be noted on this band during morning periods, especially as regards European and North African contacts. Those of us who generally use 20 metres will find it profitable to have a good switching system in both transmitter and receiver, so that advantage can be taken of conditions on 40 metres in the morning, and on 20 metres in the early evenings.

Sharing by amateurs and commercials of 100 kilo cycles in the 40-metre band has caused a lot of consternation among amateurs throughout the world, and the interference caused by commercials operating on these frequencies in the countries where this is permitted is sure to raise many a controversial point.

The American Government has given amateurs in American countries the assurance that the 100 kilo cycles will not be used by commercial interests, but as many amateurs in America often use greater power than certain commercial stations, the resulting mix-up between commercials in other countries using this frequency and these powerful American stations should be interesting.

LITTLE HEARD ABOUT FIVE METRES

I would appreciate it if amateurs who are interested and active on five metres would write and acquaint me of their activities on this band. A little publicity in these columns may be of some assistance to men keen on five, and there are many who would be interested, and perhaps, active, if there were more information available, so if any five metre man feels disposed to shoot along some information, it will certainly be of use.

THE DX BAND

Twenty metres has had some good moments during the past month, and many new countries have been worked by the ever-patient and unrelenting DX hunter.

THE chirpy T8 of YS2LR, on 14,420 k.cs., was coming through steadily for some time, and the writer was fortunate enough to contact him. He is an American stationed in Salvador, and asked that his cards be sent to W4EVX, with the promise of a sure return.

The band has definite peak periods, which do not last very long, and as times goes on these periods will get much shorter, although still remaining strong while they last.

European stations are coming through at good strength in the mornings, reaching a peak between 6.30 and 7.30 o'clock. VK2AEC contacted a Lithuanian station, prefix LY, during this period.

American signals are good for a short time during the afternoons, and many of the familiar R9 phone signals are in evidence again, but here also the duration of the peak is not long, and it is possible to hear East and West Coast signals in a very short space of time.

Conditions for American stations should improve during the coming month. At 10 p.m. American signals again come into evidence, but are not as prolific as during the afternoon period.

It is rather unfortunate that DX does not fit itself in with the leisure hours of the average amateur. By the time he scrambles home from work it is time for dinner; and when that is finished, the choicest DX has disappeared. The next period arrives when he is dreamily contemplating bed, and in the morning work confronts him. So what?

TOWERS and DIRECTIVE BEAMS

Harry Hatton, VK2AGU, of Abbotsford, has completed a very nice tower, upon which rests the latest in directive beams. The lattice tower is 40 feet high, and imbedded in concrete. It was amusing to listen on the 20 metre band to AGU's recruiting campaign for labor to assist in the erection of the tower.

The tower is very solid, and I understand that for its erection it required one man per foot—40 men for 40 feet of tower. However, it was raised without a hitch.

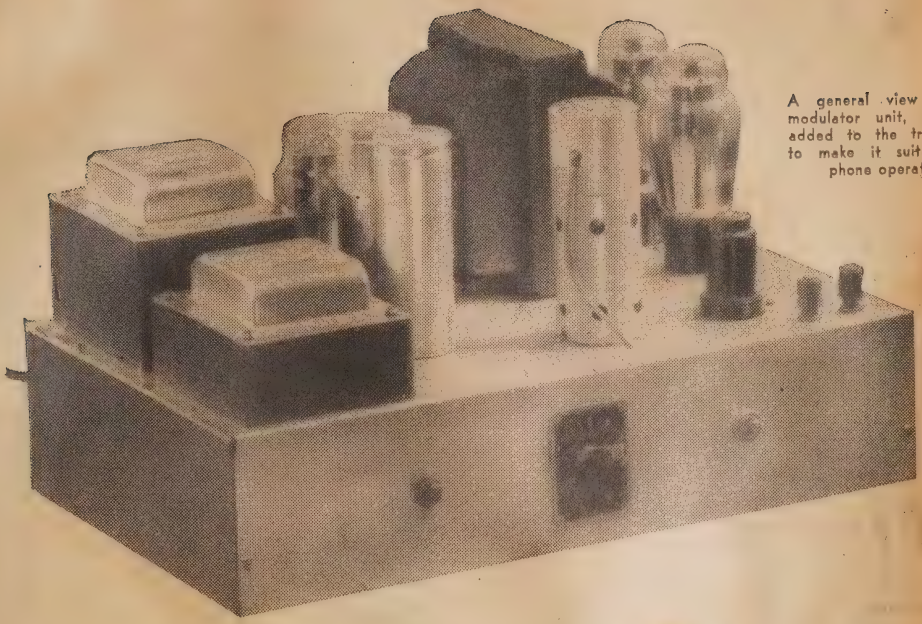
In passing I might mention a few of Mr. Hatton's contacts on 20 metre phone WITH HIS OLD AERIAL, and using an 809 in the final, with 50 watts input. Some of the choicest over the last month or so are as follows: — LX1TW, SP2HH, SM7YA, HB9AY, CN8BA, CN1AF, CT1PM, CT1PX, PA1D, HK3CL, HK5EF, EI2L, GI5NF, TG9BA, VP9G, VO2N, ZC6EC, and I1RG—and most of these have been verified. Most of the European contacts have been made during the morning.

2AGU explains that patience is required. He is on every morning, and often fails to make a good contact. Heard him operating abound 7 a.m. one day during the Easter week, and he had just polished off his seventh G phone for that morning. Why bother about the directive array, old boy? It seems almost superfluous.

AN AUSTRALIAN BEAM ANTENNA

This beam aerial is erected at the home of O. G. Oppenheim, 33 Saturn-street, Caulfield, Victorian Amateur Experimental Station VK3ZX. This aerial system, which is approximately 55ft. high, in the form of a tower, has a rotatable top, having a span of approximately 35ft. The rotating section is operated by a form of pulleys operated from the transmitting room beneath the aerial, which is a new one for Victoria, so far as Amateur Stations are concerned.

Completing



A general view of modulator unit, whic added to the transm to make it suitable phone operation.

YOUR FIRST TRANSMITTE

by adding a Modulato

By

By JOHN MOYLE, VK2JU

The modulator described here, although designed to operate with the transmitter dealt with last month, is suitable for use with practically any other transmitter to be found in the average amateur "shack." It may also be used as a high-powered amplifier for the operation of several high-powered speakers. A specially made modulation transformer allows it to be used with a wide range of output impedances.

HAVING put the transmitter of last month through its paces, the next and obvious step to take, was to provide for it a modulator. Thus, the newcomer may use it for phone work after his six months' probation is up, and the more experienced amateur can do so right away.

In this article we give a full description of the modulator which we finally built, how to make it, and how to operate it when made.

We also show here pictures of the completed transmitter, with the modulator unit in place.

Do you remember the wooden ends which were fitted to the chassis of the transmitter and the power supply? These are also fitted to the modulator chassis.

Four more strips of wood, each about 10 inches longer than the others, are screwed to the four corners of each chassis. The result is a simple and very firm rack which looks grand standing on the table. If you take a bit of extra care in finishing off your chassis by swabbing them with strong caustic soda, your finished transmitter will be something to envy.

EXCELLENT RESULTS

There has been little time to very much with the finished trans ter, apart from checking it on the cillograph, and putting it on the for a few night

The present s being used with transmitter is poor, and the of the bands so certain, that little D.X. has s been worked. however, isn't a important as a because, given mal conditions antenna, there isn't the slightest d that this transmitter will work all D.X. one is likely to require, as transmitter with an 809 properly c ated, will do.

However, the reports which have received from Australian stations i States indicate that the transmit

is every bit as good as we could
We don't wish to repeat all the
limentary things which have been
about it, but we assure you they
been complimentary.

this time, quite a few of the trans-
rs on 20 metres particularly have
ed or heard it on the air. Maybe
had better ask their operators if
like to know, or listen for your-

iously, we are quite pleased with
finished job, and the cathode ray
res show an ability to obtain per-
linear modulation up to practic-
100 per cent., or as near to it as
small cathode ray tube will read.
djusted according to our instruc-
there isn't the slightest reason
anyone should fail to obtain just
od results. And if they did, there
d be far less a number of very
transmitters operating on the
s.

DULATION TRANSFORMER

e of the first requirements of this
ulator is a good modulation trans-
er. Transformer modulation has
uch to recommend it, and is so
e, that our fondness for it is shared
ery many others.

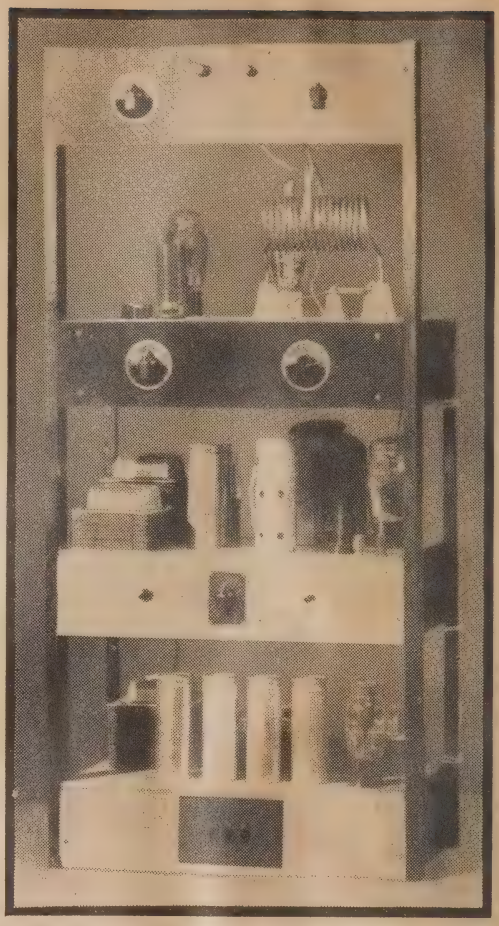
there are a large number of fac-
o be considered in the choice of a
ulation transformer, some of which
ill go into in a moment.

e long and short of it is that we
to a man who we knew by experi-
makes very good modulation trans-
ers, told him what was required,
asked for a transformer built to
specifications.

s transformer we have used, and
ve found it a very excellent piece
ork indeed.

w such transformers are costly to
and the price is so often re-
a good deal by the demand.
efore, we worked out this trans-
r so that, if operated from a pair
6G valves in push-pull on a 6600
impedance rating (plate-to-plate)
have a suitable ratio, through the
of a tapped secondary, for any of
valves used in present-day trans-
rs in Australia.

e transformer is very conservative-
ted at 25 watts, which is the maxi-
amount of audio we are legiti-
y allowed to used. There should
be a transmitter being built by
eurs to-day, for which it will not
itable. So that, even if this par-
ar modulator is not built up as it
s, maybe you will benefit by the
of this modulation transformer,
was made for us by Colton. It



Here is the transmitter completely assembled and ready for the air. The transmitter power supply is at the bottom, then comes the modulator, then the transmitter, and the top panel may be used to accommodate an aerial tuner. The modulator may be switched entirely out of circuit when desired so that the transmitter is still quite suitable for C.W. operation.

will suit any secondary impedance from 5000 to 12,000 ohms.

MODULATOR CONSIDERATIONS

A modulator is an audio power amplifier which will feed an audio signal into the output circuit of the class C modulated R.F. amplifier, so that there is a voltage swing in that plate circuit, up on the positive peaks to twice its present value, and down on the negative peaks to zero.

When this occurs, with a linear movement as demanded by a good transmitter, we are said to have linear, one-hundred-per-cent. modulation, which is the aim of everybody.

These remarks, of course, only apply to the "plate" system we have used.

Consequently, in order to do this, we must arrange for an efficient transfer of power from modulator to amplifier.

This demands that there be a perfect impedance match between the modulator and the modulated amplifier.

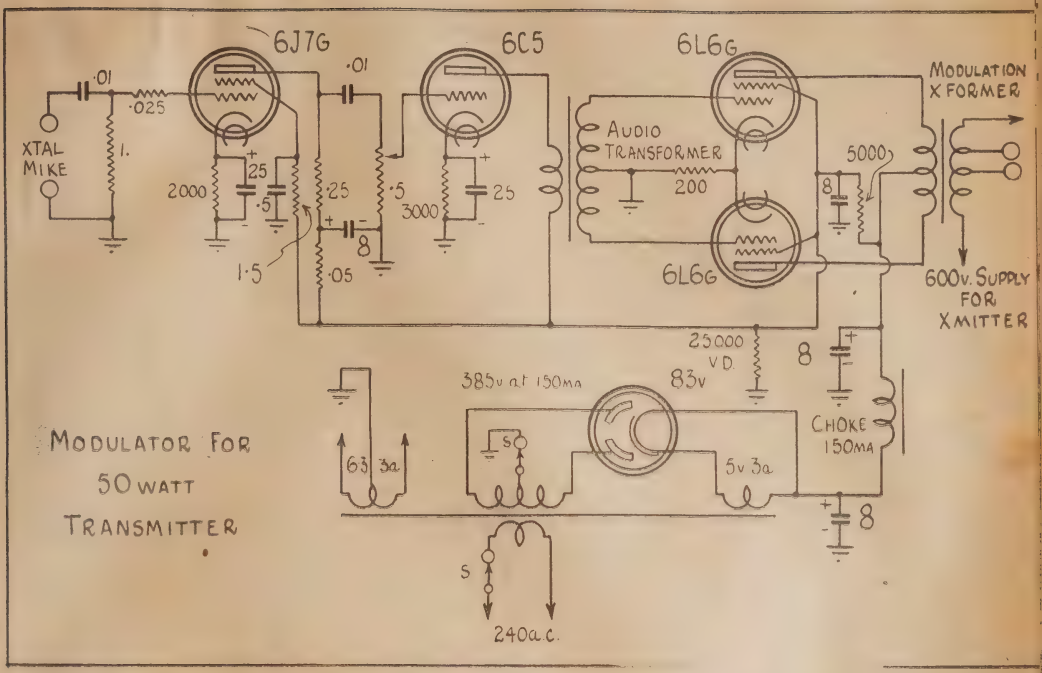
It is just this difficulty in understanding what impedance matching means, that allows fellows to use all kinds of things as modulation transformers with more or less success. It is sometimes found that the most absurd looking transformers will give quite good results, when pressed into service. But we'd hate to count the number of power transformers which have been blown up in two seconds through being forced to serve as an output coupling from a modulator vainly trying to get something from nothing.

We advise you not to waste time with such makeshifts, which in almost every case mean poor transmission and horrible inefficiency.

PARTS LIST

assis, 15 x 9 x 3½.
wer Transformer—385v. per side at 150
6.3v. at 3 amps., 5v. at 3 amps.
er Choke, 150 m.a.
cial Modulation Transformer.
mfds., 600v. Electrolytics
mfds., Tubular Electrolytics
ohms. Resistor, 120 m.a.
f0 ohms. Resistor, 25 m.a.
50 ohms. Bias Resistor
50 ohms. Bias Resistor

1 1.5 meg. Resistor
1 1 meg. Resistor
1 .25 meg. Resistor
1 .05 meg. Resistor
1 25,000 ohms. Resistor
2 25 mfds. Electrolytics
1 .5 mfds Condenser
1 .5 meg. Potentiometer
2 .01 mica condensers
Sockets—4 octal, 14 pin, 2 Switches, 6 Terminals, hook-up, wire etc.



The circuit of the modulator shows all the important circuit features. It is very straightforward and quite easy to build.

IMPEDANCE MATCHING

Here is a very simple explanation of impedance matching, as applied to this transmitter.

One must know, of course, where to start off when talking of impedance matching. Modulator or amplifier?

A little thought will show that it is the modulated amplifier which "sets the load" from which to work out your impedance ratio.

The impedance of the circuit we can take as the same as its D.C. resistance. Ohm's Law gives this to you. We have 600 volts applied to the plate, and there is a current of 83 milliamps flowing when the amplifier is properly driven and loaded.

Ohm's Law works out the resistance as between 7200 and 7300 ohms.

So far so good. Now the modulator we are using works with the output valves requiring an impedance, plate-to-plate, of 6600 ohms.

We must, therefore, use a modulation transformer which has a step-down ratio from amplifier to modulator, 7200-6600, or 1.1-1 (omitting small fractions).

If the modulator had a load requirement of 3800, for instance, then the ratio would be found in the same way. Simplicity itself!

Incidentally, impedance ratio is not the same thing as ratio between turn of the two windings. The former varie according to the square root of th turns, and not directly.

MIS-MATCHING

What would happen, then, if we use a transformer which had the ratio th wrong way round, and reflected into th modulator, a loa of, say, 10,000 ohms

The answer woul be found in exam ining the behavio of the output valve with such a loa After all, the loa requirements fo an output valve a set, bearing mind the best ou put with th lowest distortion One can nearl always get mo output from an such valves b varying the loa and increasing th distortion.

In our case, th output of th 6L6G's will ris considerably, wit too high a load, bu it will be a ris mainly at th higher frequencie and harmonics. A a result, harmoni distortion will b very high, and th

This picture shows the parts under the chassis. Note the leads coming through the hole in the chassis from the modulation transformer. These leads connect to a row of terminals at the back. The audio transformer is left centre.

production will sound that way. More serious still, as the impedance 10,000 ohms will probably be measured at 400 or 1000 cycles, it can well be many times this value at 10,000 cycles or higher. As a result, at these frequencies, the 6L6G's are able to develop very high audio voltages. They may even start off into parasitic oscillations at these frequencies, and wreck everything.

In any case, due to the very high audio peaks at high frequencies, overmodulation and splattering are almost certain to occur when things are turned up. The use of the popular crystal microphone will, of course, accentuate this tendency.

So if you wangle the taps on your modulation transformer to get more audio from the 6L6G's, you will do so at the expense of many things. In fact, if you can get enough audio to modulate fully on a lower load than 7000, by all means do so.

Often a load is placed from plate to plate of the valve in any case, to limit voltage development at high frequencies. A resistor of 15,000 ohms in series with a mica condenser of .02 will limit the transformer impedance within safe limits.

The modulation transformer you will find marked in impedance, and not in ratios. It is assumed that things will always be worked so that the 6600 ohms rating obtains for the 6L6G's, and that the voltage and plate current characteristics of the R.F. amplifier will be arranged to coincide with one of the tappings on the secondary.

A small amount of mis-matching isn't terribly important, and a lee-way of 500 ohms either way won't cause you any bother.

Incidentally, this modulator may be used with any transmitter which requires up to 30 watts to clean audio.

DESIGN

The design of the modulator wasn't a very hard task, particularly as we have been using a similar type for some years with excellent results.

The output valves were the first to be considered, and really chose themselves. A rating for them, which provides 400 volts on the plates, and 300 on the screens, will give up to 34 watts with enough drive.

Fortunately, this drive doesn't call for class B operation, in which power would be needed for the grid circuits. In other words, they can be voltage-operated.

The simplest way to do this is to use an audio transformer of a suitable step-up ratio, and feed it from a triode such as the 76 or 6C5. A very small input to the grid of this driver is needed to give, through the 3-1 step-up ratio of the transformer, more than enough grid-volts.

The quality of this audio transformer need not be of the very best, as we are only concerned with speech frequencies. If we can get reasonably flat response from about 200 to 2500 cycles, we will have enough. Any self-respecting transformer can do this. Nor is there any particular need to shunt-feed it, unless yours happens to be a type which requires this connection.

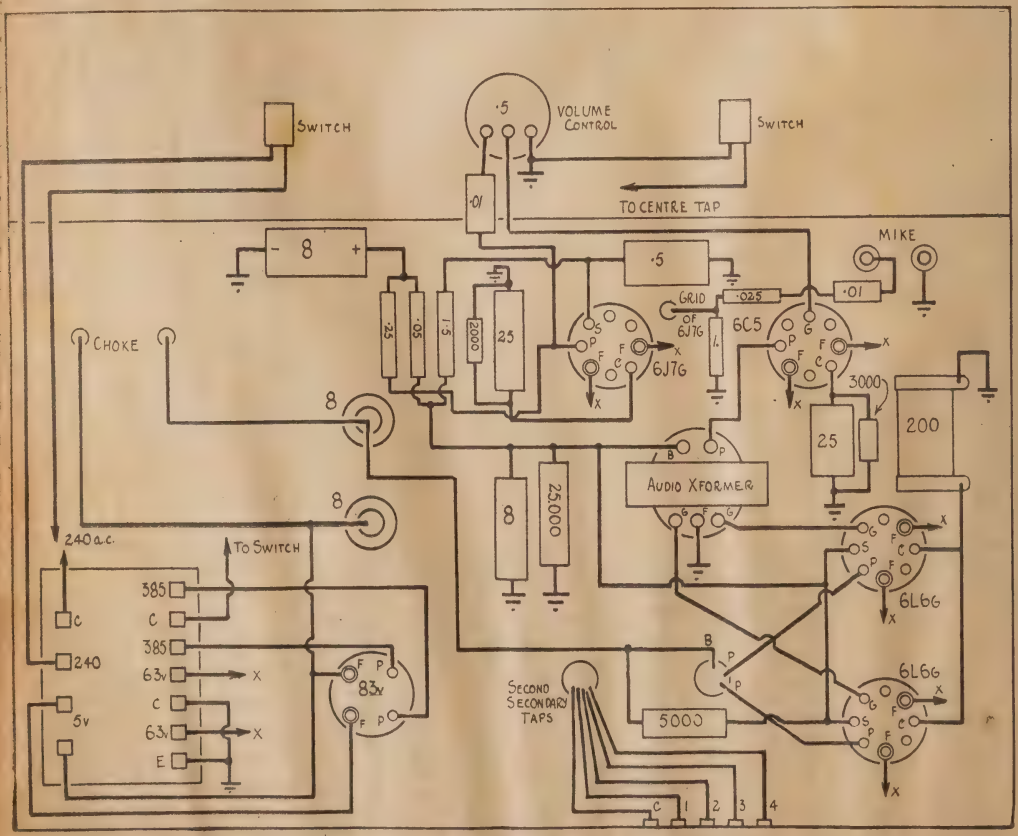
The crystal microphone, which is recommended for this modulator, needs a fairly good gain in its pre-amplifier stage, so we have used a pentode of the 6C6—6J7G type.

The over-all gain we have not measured, but it supplies every bit of the 25 watts required from a D104 with the gain three-quarters on. Thus, any other microphone with an output even a bit lower than the D104 may be used.

There is too much gain for a carbon-mike or a pick-up. If these are used, they should be tapped in to the grid circuit of the 6C5.

HUM TROUBLES

Where such a high-gain amplifier is



Picture diagram of the modulator wiring.

used, hum troubles must be guarded against. There appears to be no audible hum in the transmission, according to very local reports. If you want the same results, follow the circuit very closely, and don't skimp on those electrolytic "decouplers."

COMPONENTS

The volume control is placed in the grid circuit of the 6C5. This is done so that there will not be too much amplification behind it. It is the first stage where hum troubles are likely to be worst, and, of course, if the control were in its grid circuit, it would be "flat out" all the time, and the maximum hum content present.

Note that the load resistor for the microphone has been reduced to 1 meg instead of 5 megs, and that there is a "stopper" resistance in the hot load.

The use of the lower resistance helps to avoid feedback troubles, as 5 megs is a very high impedance, and the small drop in output is more than made up for by the modulator.

There is no need to adjust the input to the 6J7G, as the output from the microphone is never enough to overload it.

The components are all standard types. We used a pair of standard units made by Henderson, who also supplied the power supply for the transmitter. The power transformer is of the 385-150 mills type, and in conjunction with the 83V, it gives a good 400 volts output for the amplifier.

The filter choke is also rated at 150 mills.

The main filter condensers are 600 volts Solars, but the decouplers, to save space, are the tubular types tucked under the chassis. These are Ducons.

All the resistors and condensers are standard types, and the well-known I.R.C., T.C.C., Solar, Bradley, Chanex, &c., are all suitable.

The audio transformer happened to be an unshielded type (selected to make it harder) which we found in the workshop. Placed as it is, there is no evident hum-pick-up from the power supply, or from the modulation transformer. There is no harm in swivelling the transformer round, if there seems to be any such interaction, to find the position giving least hum.

VALVES

We used a 6J7G, 6C5, and two 6L6G's in the modulator, glass and metal equivalents of these can be used. If you use a 6K7 type instead of the 6J7, you will find your gain 'way down, although still enough to just do the job flat out.

Incidently, the switching allows for the mains voltage to be cut from the modulator, thus rendering it inoperative and also to break the centre-tap of the transformer for cutting the modulator while the transmitter is idling. If you don't do this, you are likely to get bad feed-back howls and other possible troubles, as the modulator has virtually no load when the R.F. amplifier isn't working.

Use of the values shown will allow all voltages to be just right. The same voltage does for both 6L6G screens, and the plate feed for the other two valves. The 5000 ohms wire-wound resistor need only carry up to 25 mills.

CONSTRUCTION

Incidentally, we used transformer coupling to the output valves because with a resistance-coupled phase-changer circuit, an extra stage would probably have been required to get enough output with a crystal microphone. Otherwise, a simple resistance coupled circuit would have done, and the price of the transformer saved. But in many ways, we prefer the transformer, and it need not be an expensive one.

There is nothing to the actual building. Our wiring diagram is drawn to scale, and as long as the layout is approximately the same, things should be fine.

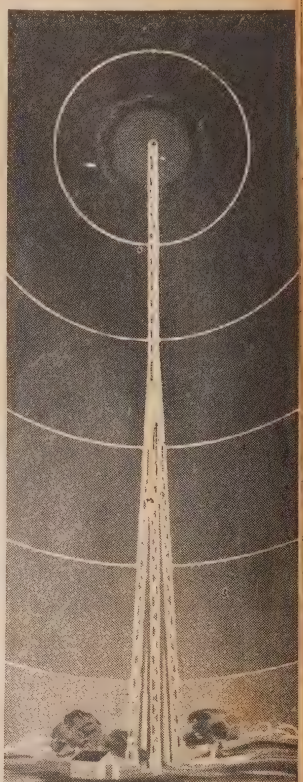
Use good sockets for the output valves —preferably moulded types such as Amphenol. Tasma also have a good inexpensive socket which can be bought. The wafer types have been known to arc over when used in high-powered audio systems.

OPERATION

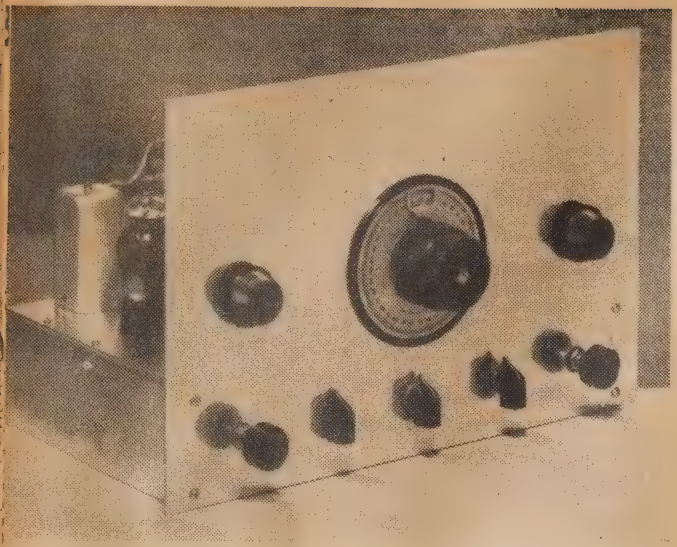
Having made sure the wiring is all correct, we may try out the modulator. Here a warning—NEVER TURN ON THE MODULATOR WITHOUT A LOAD ACROSS THE SECONDARY OF THE MODULATION TRANSFORMER. To do this is equivalent to using it with an infinite load from plate to plate. The audio voltages which may be developed could blow up the valve or anything else round the place.

Even a 10,000 ohms voltage divider will do, if you want to try it out. A pair of phones tapped across a very small section of such a resistance will enable you to hear the quality of the output.

Having made sure that all is well, the modulator may be mounted into the "rack," and the plate lead from the 809 broken so as to pass through the modulation transformer secondary.



A NEW



The receiver from the front. Any good type of dial can be used—for a change, we are showing the well-known "Utility" which is so popular. A back-panel hand-calibrated dial could be used with slightly larger chassis.

As promised in our last issue, we present here the details of a new short-wave set which actually does get six valve performance from two valves. There are no tricky reflexes in it—each valve is a legitimate double-purpose valve, and carries out the full work of two. We doubt whether one could get more from three valves.

AN efficient and economical four-valve superhet for amateur and short wave listener requirements is always in demand. Here is a receiver which will give good performance, and is very economical both to make and to run.

It is not intended to make any extravagant claims for the performance of this little receiver, but it compares most favorably with many receivers using a greater number of valves, and more costly parts.

Compared with a T.R.F. receiver using the same number of valves, it has many advantages—easier operation, is much more selective, and the over-all sensitivity is greater. It is no more costly to make than the average T.R.F. of the same size, and, having the advantage of the selective intermediate frequency stage, this receiver is much more suitable under present-day conditions.

With the amount of interference and number of high-powered stations on both the amateur and commercial bands, a highly selective receiver is necessary. This in most cases means expense. This four-valve super cuts it to a minimum.

The set can be battery powered, or used as an A.C. receiver, as described below. The filament drain is low, and the total B plus current supply required is about 25 milliamps, which makes it very suitable for use by the country amateur, or for use during field day tests.

Under rather severe operating conditions, the receiver has performed most creditably on the three bands, 20, 40, and 80 metres. Oversea reception on short wave stations, e.g., London, etc., is also excellent. The tests were carried out using a small doublet aerial, approximately 15 feet from the ground. Little difference was noticed when using a 66ft. zepp, but those wishing a greater signal response can, of course, construct an aerial which will net in those few extra stations.

VALVE LINE-UP

Each valve used is of the double-purpose variety. The 6K8G and the 6C8G are valves of recent date, but the 6F7 pentode-triode valve has been in use for a number of years.

In this manner the receiver can be compared with a 6 valve superhet, the 6K8G acting as oscillator and first detector, the 6F7 as pentode intermediate frequency amplifier and triode second detector, and the 6C8G as audio amplifier and beat frequency oscillator. The rectifier used is the standard type 5Y3G valve.

REGENERATION ON 6K8G

There is little to be said about the 6K8G; last month's issue covered the performance and characteristics of this valve fully. On higher frequencies it gives better gain than other valves, due to its high grid impedance and conversion conductance. The grid input impedance of the 6K8G is negative at high frequencies, giving improved Q in the tuned grid circuit, and hence better gain and image ratio.

With the thought in mind that it would be possible to improve the negative effect of the valve, it was decided to experiment with a small amount of external regeneration by returning the cathode through the bottom of the signal grid coil. This is controlled by varying the screen voltage of the 6K8G.

Tests have proved the regeneration to be quite satisfactory, and the control very smooth. The increase in gain brought up the strength of DX signals considerably.

Another reason for the use of the 6K8G is its high oscillator mutual conductance (3000 micro-ohms), which is considerably higher than most other valves. This means that the amount of coupling required is very small, and the primary turns of the oscillator coil, as shown in the text, should be closely

LIST OF PARTS REQUIRED

1 chassis, 14in. x 10in. x 3in.
1 panel, 15in. x 10in.
1 shield, 6in. x 7in.
1 bracket, 3in. x 3in.
1 tuning dial.
4 midget condensers (see article).
2 flexible couplers.
2 high gain intermediates.
1 beat oscillator coil.
1 power transformer (Henderson), 250-0-250 at 300 mills., 6.3 volts at 1.5 amps, 5 volts at 2 amps.
1 5000 ohms potentiometer.
1 20,000 ohms. potentiometer.
1 .5 meg. potentiometer.
1 phone jack.
3 switches.
1 ten henry choke (low resistance).
2 eight mfds. electrolytic condensers.
1 twenty-five mfds. tubular condenser.
2 .5 tubular condensers.
4 .1 tubular condensers.
1 .5 tubular condenser.
1 .1 tubular condenser.
1 .01 mica condenser.
5 .0001 mica condensers.
1 .00005 mica condenser.
2 2-megohm resistors.
2 .25 megohm resistors.
1 50,000 ohm resistor.
1 25,000 ohm resistor.
1 15,000 ohm resistor.
1 14,000 ohm resistor.
1 400 ohm resistor.
1 300 ohm resistor.
3 octal wafer sockets.
1 small 7 pin wafer socket.
1 4 pin wafer socket.
1 5 pin wafer socket.

Valves.

6K8G, 6F7, 6C8G, 5Y3G.
3 four pin coil forms.
3 five pin coil forms.
5 knobs, hardware, etc.

AMATEUR 3-VALVE SET

With 6-valve performance

adhered to, as they have been adjusted to give the correct oscillator grid current.

Little difficulty will be experienced in adjustment, and the addition of regeneration will be found to be well worth the effort expended.

I.F. AMPLIFIER AND SECOND DETECTOR

The 6F7 was chosen because of its two sections. The triode section is an excellent second detector. It has the advantage over the diode type detector in this respect that it is possible to use leaky grid detection, which is much more sensitive than diode rectification or detection. The diode type detector draws current during operation, causing a dampening effect across the secondary of the intermediate transformer, thus limiting its selective response.

In most cases, when maximum sensitivity is required, it is preferable to use either the leaky grid type of detector, or anode bend. The triode section has a medium-mu, and it operates very satisfactorily, giving ample output to excite the first section of the 6C8G.

The pentode section of the 6F7 is very close in characteristics to the 6B7. The amplification factor is slightly higher, but the G.M. is a little lower. Under operating conditions there is very little marked difference between the pentode sections of each tube.

The use of high gain iron-cored transformers ensures the maximum gain from both the output of the 6K8G and the 6F7 amplifier. As can be seen, there is also a saving of one valve in the use of the 6F7, as there is in the use of the 6K8G.

In many other circuits where a minimum of tubes are used it is very often the practice to use only one intermediate frequency transformer. As can be seen from the circuit of this receiver, full advantage is taken of a complete stage of I.F. amplification, which is far to be preferred to the use of one I.F. transformer, followed by a regenerative detector, or something similar.

Excessive regeneration is not the best in any type of circuit, and it is often found that when using regeneration in two parts of a receiver serious interlocking and detuning effects arise. The 6F7 has proved very successful as an I.F. amplifier and second detector, comparing very favorably with any other pentode I.F. amplifier and grid leak detector where separate tubes are used.

6C8G

As this receiver aims at economy in consumption of power, the most obvious valve to choose as an audio amplifier and beat frequency oscillator combined is the 6C8G.

The 6C8G is a twin triode valve, each section being independent of the other, and having separate cathodes, etc. The grid of one triode comes out at the top of the bulb, and the grid of the other at the bottom.

This is the result of some collaboration between our Technical Editor and Mr. V. A. Bennett, well-known receiver expert, and writer of our amateur notes. The set was actually built by Mr. Bennett, who thus becomes a technical contributor to our paper. He is responsible for the developmental work on the set, particularly in the application of regeneration to the 6K8G. The use of the 6C8G as beat oscillator has already been used in Wireless Weekly receivers, and has proved itself to be a first-class circuit. Everyone should find something of interest in this receiver.

In this case, the triode having the grid at the top was chosen as the audio amplifier. The receiver was originally designed for operation with headphones, but it was found that the audio output from the 6C8G was sufficient to drive a small permagnetic speaker.

The volume is not terrific, but on local phone and the stronger oversea stations the output is sufficiently strong to require attenuating.

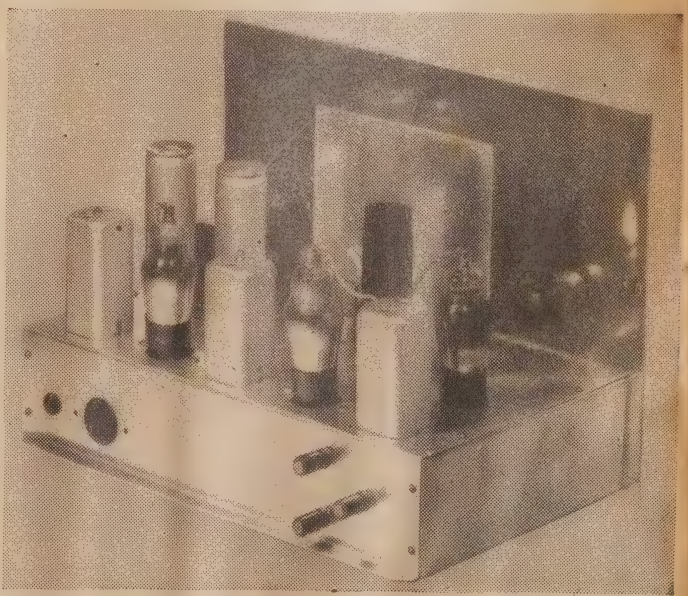
SPEAKER

The speaker is one of the new "Rola" 240 milliwatt type, and, although the matching transformer was intended for use with a 1C5G 1.4 volt output valve the results obtained when using it with the 6C8G are rather promising.

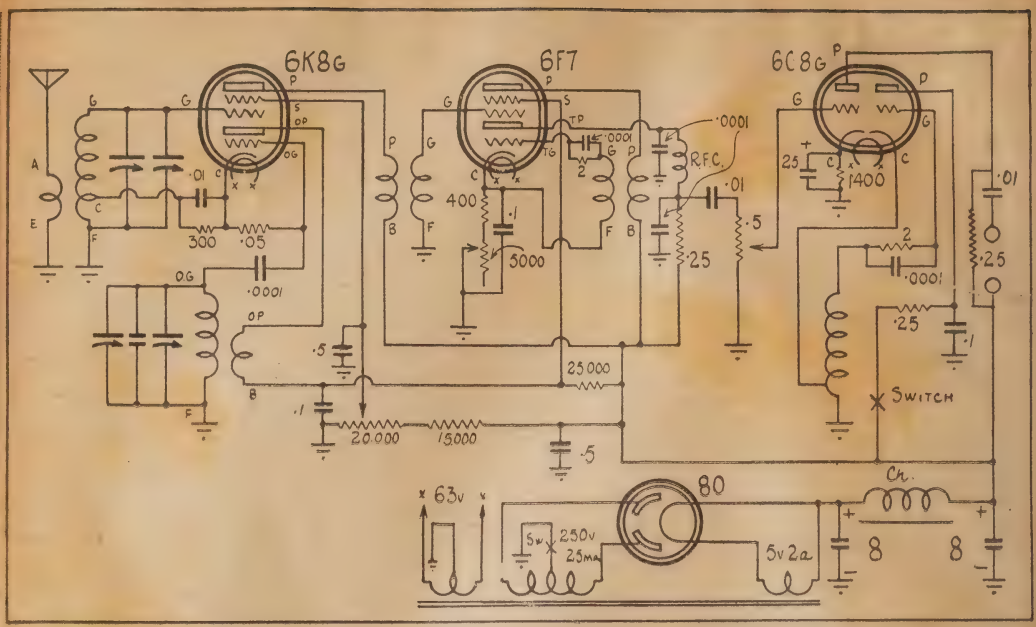
As can be seen from the circuit, an Alpha double pole switch is used to switch the receiver from speaker to headphone use.

The second section of the 6C8G is used as the B.F.O. valve, and it works admirably. There is little to be said of this valve working under these conditions, as it is not entirely new, and has become very popular in this capacity.

No external coupling is required, as there is sufficient capacitive coupling between the elements of the valve to give the desired beat note. If a stronger beat is required, the output of the oscillator can be increased by altering the plate resistor to a lower value. So, here again, use of an extra valve is



From the rear of the set a good idea of layout is obtained. The can on the extreme left is the beat oscillator coil.



All the design features mentioned in the article are illustrated in the circuit. The grid leak and condenser for the beat oscillator are contained inside the beat coil can.

dispensed with, without the loss of efficiency.

POWER SUPPLY—ANOTHER ECONOMY FEATURE

The power transformer is a small Henderson 250 volt per side, with a 6.3 and 5 volt winding, and a current rating of 30 m.a. This transformer is very cheap, and quite big enough for the requirements of this set. The choke is a 10 henry low resistance type, which was originally attached to a speaker.

There should be no difficulty in purchasing a small power choke of this type for a few shillings.

Two 8 ufd. electrolytic condensers finish the power unit. There is no voltage divider included, as all units are supplied with their necessary power through suitable dropping resistors. This assists the smoothing of the B plus, as the resistors and by-pass condensers act as a resistive filter.

THE CIRCUIT

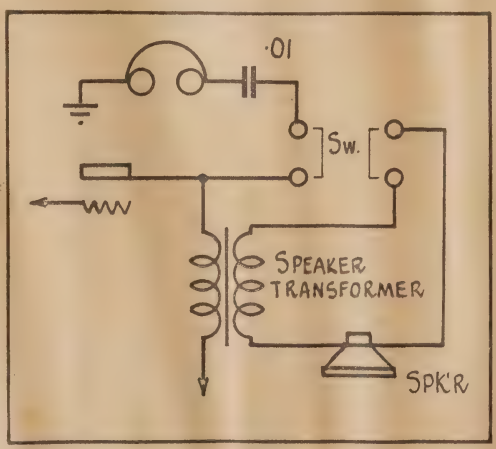
As can be seen from the accompanying sketch, the circuit is straightforward. The inclusion of regeneration on the 6K8G is a departure from standard, but, as previously explained, is worth the trouble. The intermediate frequency transformers used are of the high gain, iron-cored type, using Trolitul insulation. Any type of good transformer will do the job, but, as the number of valves has been cut to a minimum, use of good transformers is a help when efficiency is the aim in a set of this nature.

The 6F7 pentode section is used as a standard pentode intermediate frequency amplifier with a 5000 ohm potentiometer in the cathode circuit to control the gain and avoid overloading the triode detector.

A 400 ohms limiting resistor is connected between the potentiometer and cathode. This maintains a constant bias of .3 volts on the pentode section, which is necessary for smooth operation.

The secondary of the I.F. transformer is connected to the triode grid through a .0001 condenser and 2 megohm resistor. The earth end of the transformer is connected direct to the cathode. The plate resistor is a .25 meg., with the conventional R.F. choke, and .0001 by-pass condensers.

A 25,000 ohm dropping resistor supplies the voltage for both the plate of the 6K8G oscillator section and the screen of the 6F7. If the leads are kept short, it is possible to use only one .1 ufd. by-pass condenser for the two, both oscillator plate and 6F7 screen.



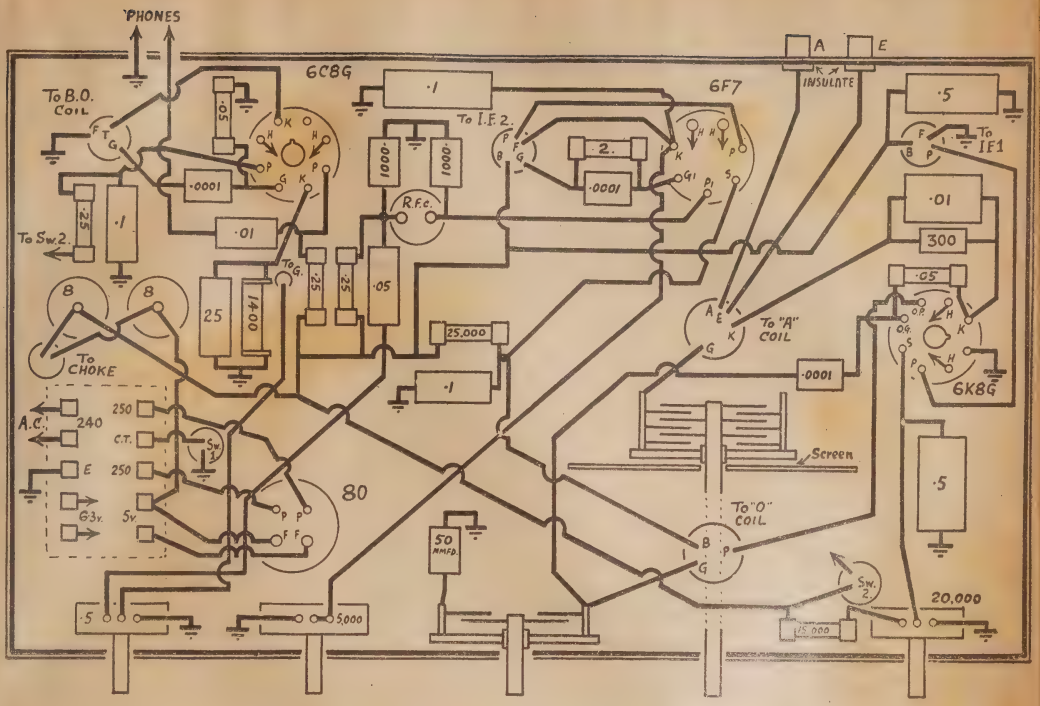
If the speaker transformer is mounted on the chassis, a switch can be used to provide headphone or speaker operation. these are the connections.

AUDIO SECTION and F.F.G.

The volume control in the grid circuit of the 6C8G is a .5 megohm potentiometer, and the coupling condenser a .05 ufd. tubular type. Smaller capacities may be tried in this position. The size is not critical.

As stated before, it was first intended to use only phones; in this case, a .25 megohm plate loading resistor with a .10 ufd. tubular condenser connected from the plate of the 6C8G to the phone jack. By this method all D.C. voltage is kept from the phones, and eliminates the chances of shocks.

If using a small speaker, the primary of the transformer acts as the plate loading choke, as shown in the diagram. For my own use, phones are required, but the possibility of using a



The wiring diagram shows all connections under the base.

speaker may be attractive to short-wave listeners, and, as proved, it worked quite successfully.

COILS

The coils are wound on Marquis ribbed formers, using a four-pin former for the oscillator coil, and a 5-pin for the detector. The oscillator plate coil is interwound between the turns of the grid coil, the first turn commencing below the first turn of the grid coil.

If possible, adhere to the specifications given in the text, as they are adjusted to give optimum performance. Due to differences in wiring, a small adjustment of the grid turns may be necessary. The oscillator grid section has 3 condensers in parallel with the coil, a 50 ufd. fixed mica condenser and a 3 plate trimming condenser, plus the 3 plate tuning or band spread condenser.

Having the fixed capacity as shown, with a small variable condenser across, makes it a little more difficult in coil adjustments, but it is a decided advantage when changing bands, as the oscillator can be peaked with the vernier control of the small variable condenser; and, once the coils are completed, the job is done, and the benefits of the trimmer will be appreciated.

The coils in the oscillator section are a fraction smaller than in the detector tuning. This allows for higher C, giving increased stability in the oscillator, and better tracking of the tuned circuits. The detector coils have the aerial coupling coil wound at the earth end of the grid coil; approximately one-quarter of an inch between the two coils.

Coupling does not need to be too tight, as it upsets the regeneration control. The sensitivity of the 6K8G is ample to allow fairly loose coupling, and the loose coupling reduces the capacity effect between the coils, thereby reducing the chances of image interference from commercial stations on the high frequency bands.

The cathode tap can be adjusted if a greater regenerative effect is desired, but the specified tapping is recommended, as the amount of regeneration required is only small.

The best method of adjustment is to increase the 20,000 ohm. potentiometer until the grid voltage is almost on maximum setting, and then to adjust the tap until the amount of regeneration required is achieved. The amount of control is limited, as a detuning effect occurs when the voltage on the screen is varied through wide limits.

When properly adjusted the control is very smooth, and the complete amateur bands can be tuned across without the necessity of touching the regeneration control.

LAYOUT

As can be seen from the illustrations, there is nothing complicated in the general layout. The coil sockets are mounted above the chassis on long one-eighth screws, using pieces of tubing or spacing washers. This keeps the leads shorter, and also makes the coils more accessible when changing bands.

There is only one shield, and that is used mainly as a support for the tuning condensers. Valve shield cans have been dispensed with, as they were found unnecessary, and this is a further economy. The oscillator coil is in the front section with the detector coil and condenser directly behind.

The first I.F. transformer is behind the 6K8G, and the 6F7 I.F. transformer in line along the back. This method allows very short leads, the wiring is simple. The heater leads are kept in the corner of the chassis, and around the edge. At the extreme right-hand the B.F.O. coil unit is situated. The triode section of

(Continued on Next Page)

COIL DATA

Band	Oscillator. Plate	Grid	A	Detector. Grid	Tap
20	3½ turns	7 turns	4 turns	8½ turns	1-3 turn
40	6 turns	13¾ turns	7 turns	15½ turns	¾ turns
80	9½ turns	19 turns	12 turns	32 turns	1½ turns

All coils are wound on 1½ formers; 20 and 40 metre coils are wound with 20 B. and S. enamel for the grid coils, spaced 1½ inches; plate and antennae coils with 30 S.W.G. silk covered 80 metre grid coils, 26-gauge enamel. Plate and antennae coils, 30-gauge silk covered.

A NEW AMATEUR 3-VALVE SET

(Continued from Previous Page)

the 6C8G for the B.F.O. unit is connected under the chassis.

Shielded wire is used on the audio leads from the .05 coupling condenser to the .5 meg. resistor, and then from the .5 meg. resistor the grid cap of the 6C8G. The power transformer is mounted on the right-hand side at the front.

The 5Y3G rectifier is on the left, keeping the electrolytic condensers at the back of the transformer. This keeps the heat from the 5Y3G from drying up the electrolytics. The small power choke is mounted under the chassis, being screwed to the side. At the back of the power choke the phone jack is mounted. This makes the jack accessible when plugging in the phones.

For the sake of rigidity, mounting strips are used for a number of the resistors and by-pass condensers. The on-off switch and B.F.O. switch are mounted on the front panel—rotary type "Alpha" switches are used.

This makes the front panel more symmetrical, as a knob or pointer can be used to operate the switch. A socket is mounted on the back so that battery leads can be connected with the receiver when it is used for field day activities.

When using a speaker, the transformer is mounted on the back of the chassis, with a switch connected, as shown in the text. To couple the voice coil to the transformer, use a short length of heavy twisted power flex, which at audio frequencies has the correct impedance. Little more can be said about the layout. The aluminium chassis is used as a common earth.

Make sure when tightening nuts, etc., that they bite into the metal, ensuring a good contact. Make sure of all insulated points. The antennae terminals are at the back of the chassis, two for the double antennae, and one for the earth.

There is no means of varying the beat frequency oscillator pitch, but it is an easy matter to place a small 2-plate, variable condenser in parallel with the internal condenser of the B.F.O. circuits.

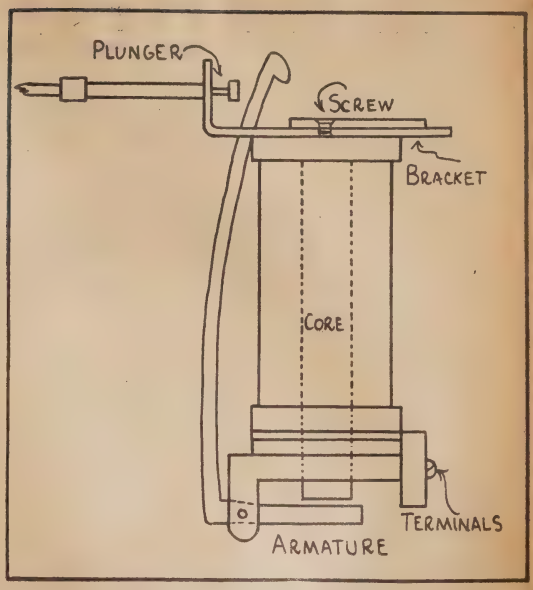
The tuning condensers are all "Raymart" midget type, but any good quality midget will be found to be suitable.

Inquiries through this paper from those contemplating construction of this receiver will be welcomed.

A MAGNETIC SHUTTER RELEASE

by remote control

By A. McLEOD



Here is an outline drawing showing the details of the mechanism. Compare it with the photograph below.

RECENTLY, the necessity of securing some studies of bird life introduced the question of a means for remotely releasing the shutter, which would be positive in action and readily adaptable to a variety of conditions, irrespective of the distance at which it might be used. The accompanying illustrations show an easily-constructed device which fulfills these requirements.

The main assembly, consisting essentially of two electro-magnets and armature, is a discarded drop-shutter mechanism from an old telephone switchboard. Little difficulty should be experienced in picking up one of these units at an electrical junk store, for a nominal sum. Mine cost me 1/6.

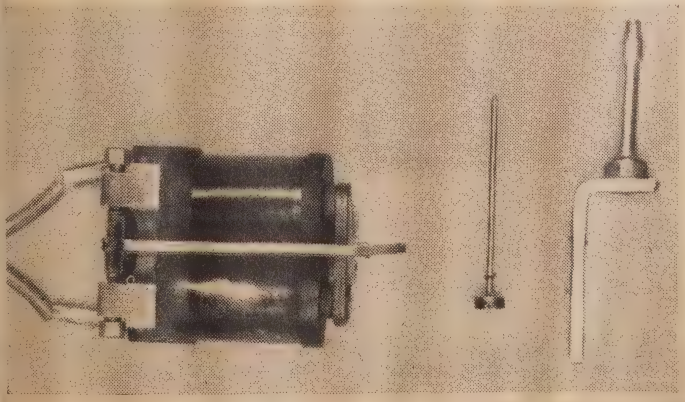
REWINDING THE MAGNET

The first step will be to rewind the magnets with as much No. 24 gauge enamelled copper wire as will evenly fill the formers. Wind both magnets in the same direction and couple them by connecting the two starts together and the two finishes to the terminals. The method of adapting the unit to actuate the antinous release of a shutter is simple and straightforward.

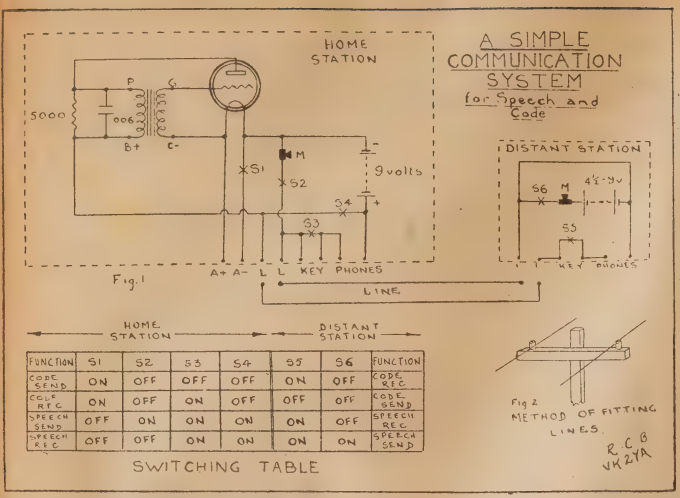
A strip of 16 gauge brass, 2in. x 3-8in. has a third of its length bent at right angles to form a bracket. The long side is slotted along its centre for a distance of about half an inch commencing at the bend. Through this slot the lever attached to the armature will pass when assembly has been completed. A hole is bored through the shorter-angled portion, into which is soldered an inch length of 1-8in. brass tubing. To the other end of the tube is soldered the threaded nipple of a cable release. A piece of brass wire of appropriate gauge and length is inserted in the tube to act as a plunger. It is advisable to solder a small circular collar to the back of the latter to prevent its falling out of the tube when not in use.

Assembly is completed by clamping the bracket under the iron plate, which connects the two magnets. The unit may be slid along the bracket to obtain optimum adjustment.

Screwed into the antinous release socket of a shutter and connected to a 4½ volt battery, this little accessory will perform its function efficiently and dependably. There is no limit to the distance at which it will operate, provided that the voltage is increased accordingly. A bell-push, connected in series, provides the best form of switch for contacting, because it may be conveniently held in the hand ready for instant action.



This photograph shows the various parts of the original control. To the left is the rewound bobbin assembly looking down from the top, in the centre is the plunger, and at the extreme right is seen the bracket and tube which accommodate the plunger.



HOME STATION						DISTANT STATION	
FUNCTION	S1	S2	S3	S4	S5	S6	FUNCTION
CODE SEND	ON	OFF	OFF	OFF	ON	OFF	CODE REC.
CODE REC.	ON	OFF	ON	OFF	OFF	OFF	CODE SEND
SPEECH SEND	OFF	ON	ON	ON	ON	OFF	SPEECH REC.
SPEECH REC.	OFF	OFF	ON	ON	ON	ON	SPEECH SEND

SWITCHING TABLE

This is the circuit diagram, which shows all the details of the hook-up. The table makes clear all the switch positions for the various sending and receiving.

☆ ☆ ☆

Something you have been waiting for—a simple communication system for Morse Code or Telephone, which may be rigged up simply and cheaply, to work over quite a distance. And there are no complications!

☆ ☆ ☆

YOUR PRIVATE TELEPHONE

for C.W. or Phone

By R. C. BLACK—VK2YA

FREQUENTLY beginners who are interested in studying for the Amateur Operator's Certificate of Proficiency live next door or close to an active "ham," and, no doubt, spend a considerable amount of time in practising reception and sending of Morse signals under the tuition of a licensee.

The simple communications system described herewith provides a reliable and cheap method of practising operating, with the added advantage of enabling the learner to do so from his own home. Furthermore, provision is made for using speech to check over the correctness of the Morse signals received.

CONVENIENCE

During the winter months even the most enthusiastic learner has moments when he hesitates to go out into the mud and slush to visit his "ham" friend, and thus the regularity of nightly practice is broken. Also, the "ham" friend's wife, or mother, or landlady, as the case may be, will probably indulge in a spot of indignation at the importation of mud into the house by means of visitor's boots, and the atmosphere becomes somewhat tense under such circumstances. Probably it would be quite possible to contrive a unit that could be installed under the bedclothes in extremely cold weather, but I should imagine that greater benefit would result from more normal situations.

From the point of view of the benevolent "ham" an installation of this nature is most desirable. It is a regrettable fact that many enthusiastic beginners in the radio game who make a habit of visiting "hams" lack the happy knack of knowing just when to go home. Personally, I have lost hours of sleep through the inability of visitors to take a hint, and this outfit will prove a boon to many "hams" who prefer to keep their satellites at a distance.

GENERAL DESCRIPTION

Briefly, the installation comprises a "home" station and a "distant" station joined by a twin line. The "home" station consists of an audio oscillator with microphone and "mike" battery as auxiliaries for speech operation. The "distant" station consists of headphones, key, microphone, battery and switches.

The entire job is quite simple, and there is very little possibility of striking trouble. Maintenance costs are low, involving merely the replacement of batteries at infrequent intervals. The original "home" station employed an ancient "Wecovalve" of the peanut variety, taking 1¼ volts on the filament, thus enabling a single No. 6 dry cell to be used as filament supply. An improvement was effected after the recent sad demise of the Wecovalve by installing an A.C. type valve—a type 27, to be precise—and a small filament transformer. This reduced the number of batteries that require renewal, but restricts the portability of the unit to places where power is available.

The original "home" station was constructed in a wooden case having an upper and lower section. The top compartment housed the audio oscillator, while the batteries were accommodated in the lower section. A front panel of three-ply was provided with two-line terminals at the top, switches, and microphone, headphone and key terminals in a row about three inches from the bottom edge. The whole outfit was given a gloss black finish, and a carrying handle was mounted on top.

SIMPLE CABINET

A large cigar box suitably stained makes a neat container for this outfit, with phone terminals and two switches mounted on the front, two terminals at the left-hand end to connect to the turn line, and four at the right-hand end for microphone and key. The "mike" battery is housed inside the box, and the whole outfit is very neat and compact.

Of course, it is quite in order to use a "bread-board" layout for the entire installation, but for the sake of neatness and compactness the use of boxes as suggested is recommended.

TWIN LINE

It is most advisable to make a really sound job of this, as it is most annoying to find sudden silence occurring during a wet and windy night and to

have to creep out into the elements to effect repairs. Covered 18 gauge wire as used in electricity house wiring is very serviceable, but 3/20 aerial wire will do quite well. On no account use thin copper wire of the 32 gauge order as I did for the experimental set-up.

Keep the line well insulated and remote from power lines and from gutterings where short-circuiting may occur.

OPERATION

The table of switch positions for the various methods of operation can be copied and pinned to the wall or table, but after a little practice the operator becomes accustomed to the procedure and no longer needs to refer to it.

For **sending code** the audio oscillator is in operation, and the filament is switched on by switch S1. Switches S2 and S4 are off, as their function is to bring the microphone into circuit. The key shorting switch (S3) is "off" for operating the "home" station, but switch (S5) at the "distant" station must be "on." It will be seen that phones and key are in series at the "home" station; those at the "distant" station are also in series—the four components being in series via the turn line. This makes it necessary for the listening station key to be shorted for signals to be heard in the phones at both ends. Thus, the sender can monitor his own sending and take due care to achieve correct spacing.

Components for "Home" Station

1 valve,
1 valve socket,
1 "A" battery to suit,
2 4½ volts "C" batteries for "B" supply,
1 audio transformer,
1 5000 ohm fixed resistor,
1 fixed condenser (see circuit),
1 P.M.G. microphone and stand,
1 pair headphones,
1 Morse key,
Sundry terminals, screws, solder lugs, &c.,
1 box to suit.

Components for "Distant" Station

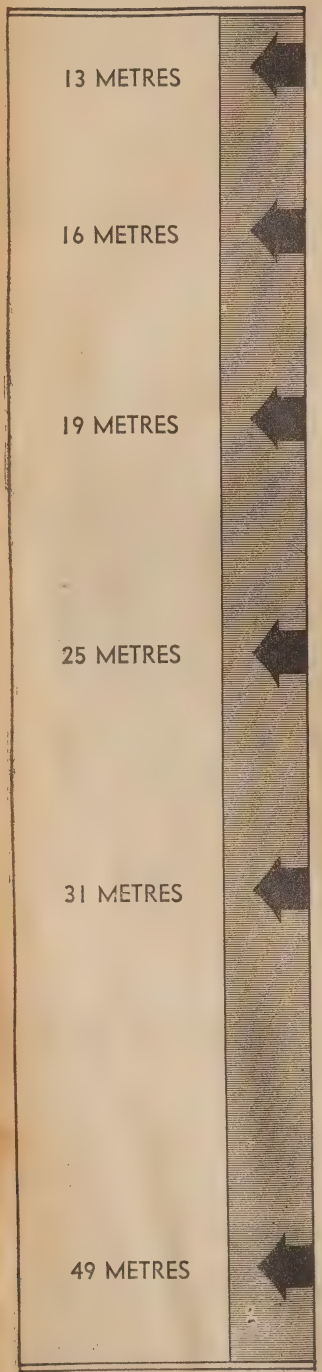
1 large cigar box,
2 switches,
1 P.M.G. microphone,
1 microphone battery (4½ volt "C" battery),
1 pair headphones,
1 Morse key,
Sundry terminals, screws, solder lugs, &c.

In the event of a word being missed, the listener merely opens the key switch, and everything goes silent. The sender then knows that the listener has failed to copy the last word sent. Both hold down their keys simultaneously to re-establish communication, and the listener asks for a repetition in the correct manner. It is remarkable how rapidly a learner can pick up the fine points of operating procedure with regular practice.

For speech operation, the audio oscillator is not in use, so the filament switch (S1) is "off." Switches S2, S3, S4 are "on" when the "home" station is

(Continued on Page 71)

S. W. TUNING CHART



13 Metres

No stations now audible at entertainment value.

16 Metres

GSG, London, 16.86 m., 11.0 p.m. till midnight.
GSV, London, 16.84 m., 11.0 p.m. till midnight.
DJE, Berlin, 16.89 m., 11.0 p.m. till 2.0 a.m.
W3XL, New York, 16.87 m., 8.0 a.m. till 11.0 a.m.

19 Metres

GSF, London, 19.82 m., 4.30 p.m. till 6.45 p.m.
GSO, London, 19.76 m., 4.30 p.m. till 6.45 p.m.
DJB, Berlin, 19.74 m., 4.30 p.m. till 6.0 p.m.; 11.0 p.m. till 2.0 a.m.
TPA2, Paris, 19.68 m., 11.0 p.m. till 2.0 a.m.
PCJ2, Huizen, Holland, 15,220 k.c., 19.7 m., 6.0 p.m. till 7.30 p.m.
YDC, Java, 19.80 m., 9.0 p.m. till midnight.

25 Metres

VLR3, Lyndhurst, 25.25 m., 1.0 p.m. till 6.0 p.m.
GSD, London, 25.53 m., 4.30 p.m. till 6.45 p.m.
DJD, Berlin, 25.49 m., 1.0 p.m. till 2.0 p.m.
12RO4, Rome, 25.40 m., 5.50 a.m. till 7.0 a.m.
XMHA, Shanghai, 25.32 m., 9.0 p.m. till midnight.

31 Metres

VLR, Lyndhurst, 31.32 m., 6.30 p.m. till 7.30 p.m.
GSB, London, 31.55 m., 6.0 p.m. till 6.45 p.m.; 6.0 a.m. till 7.0 a.m.
GSC, London, 31.70 m., 6.0 a.m. till 7.30 a.m.
W6XBE, San Francisco, 31.48 m., 10.0 p.m. till midnight.
12RO3, Rome, 31.13 m., 6.0 a.m. till 8.0 a.m.
RV26, Moscow, 31.5 m., 6.0 a.m. till 7.0 a.m.; 11.0 p.m. till midnight.

49 Metres

W8XAL, Cincinnati, U.S.A., 9.0 p.m. till 10.0 p.m.
"RADIO SAIGON," 49.05 m., 9.30 p.m. till 11.30 p.m.
XEXA, Mexico City, 48.6 m., 10.30 p.m. till 11.30 p.m.
DJC, Berlin, 49.83 m., 6.0 a.m. till 7.20 a.m.
VK9MI, Kanimbla, 49.54 m., 9.30 p.m. till 10.30 p.m.
HP5K, Panama City, 49.96 m., 10.0 p.m. till 10.30 p.m.
JLT, Tokio, 48.4 m., 11.0 p.m. on.

Times shown are not always actual opening times, but indicate in most cases when best reception may be expected.

OVERSEAS BROADCASTERS

Listening conditions have again been good on the various short-wave channels, especially the 25 and 31 metre bands. The 31-metre band has been especially good in the early mornings and late afternoons.

Daventry.—The Empire transmitters as usual have given us many enjoyable programmes, while their news bulletins can always be relied upon to give impartial information. Perhaps the best stations of all are GSD on the 25-metre band and GSB on 31.55 m. in the No. 1 transmission at 4.30 p.m.

Germany.—From an entertainment point of view the German stations have always been very popular, while their many news sessions allow one to hear their side of the many international problems now facing Europe at the present time. Among the best are DJX on 31.01 m. and DJB on 19.74 m.

Italy.—2RO3 on 31.13 m. and 2RO9 on 31.02 m. are heard well in the early mornings around 7 o'clock, while 2RO6 on 16.84 m. can still be heard around midnight at fair strength.

Turkey.—The Turkish station, TAP, on 31.7 m., is still coming in at good strength in the mornings, and is easily found, being the last station on this band at that time. All English type recordings, and quality excellent. Closes at 8.0 a.m.

U.S.A. — As mentioned elsewhere, W6XBE on 31.48 m. is now the best American station on the air, and provides some very enjoyable programmes after they open at 10.0 p.m. W3XAL on 31.03 m., in New York, can now also be heard very well from about 3.30 p.m. until they close at 4.0 p.m.

China.—Listeners who wish to hear first-hand news of the fighting in China are advised to listen to XGOY on 25.21 m., when they give their English news service around 9.15 p.m., while at 1.45 p.m. from XGOX on 16.84 m. further news items may be heard.

Japan.—The Japanese station JZK on 19.79 m. now opens nightly at 10 o'clock at full speaker strength in one of their overseas broadcasts, when many interesting items may be heard.

Australia.—Last but not least our own ever popular VLR and VLR3 enable our outback listeners to enjoy the national and regional programmes with the same consistency as city listeners. In addition to these we have VK2ME, VK3ME, VK6ME, and VK9MI, who all provide varied and entertaining programmes for both local and overseas listeners.

The MONTH IN REVIEW

The last month has been a most interesting one from many different angles, as changing conditions due to seasonal effects have enabled new stations to be heard, which are missing from our dials during the summer months. The many political moves in Europe have made the short wave bands even more popular.

PERHAPS the greatest change in reception has been the improvement of the many Central and South American stations, which have a fascination all their own.

On Sunday, March 26, from 7.30 p.m., a wonderful opportunity was obtained to log a host of unusual stations. As near as we could gather, a cross-continental car or aeroplane race was in progress, starting from Santiago, Chile.

This broadcast was carried by the following stations: CB960, "La Vox de la Americano," on 9600 kc. 31.25 m., Santiago, Chile; CB970, "La Co-operative Vitalicia," 9730 kc. in Valparaiso, Chile; CXA8, on 9640 kc., in Colonia, Uruguay (rebroadcasting Radio Belgrano, Buenos Aires, Argentina), and also from LRX, "Radio el Mundo," on 9660 kc. 21.06 m., in Buenos Aires, Argentina.

The first-mentioned station, CB960, was at great strength when first heard at 7.30 p.m. and continued so until after 10 p.m. All the others were also good speaker strength.

Great excitement was shown by the onlookers, who could be heard shouting and cheering as the cars or planes roared past, while the various announcers called out the numbers in Spanish.

Altogether, it was a most enjoyable broadcast, quite apart from the fact that it enabled us to log two new stations, in CB960 and CB970. At a later date we also heard both these stations closing at 3 p.m. and 4 p.m., respectively, on Sundays.

CZECHOSLOVAKIA AND SPAIN

All listeners, we feel sure, will regret the passing of the many OLR Czechoslovakian stations due to the changed political situation in that part of Europe.

Since they came on the air a few years ago they have provided us with many enjoyable programmes, while the fascinating voice of the lady announcer has often been commented on. Before long, we may once again hear the familiar identification signal, but probably under different call letters.

On the morning of March 29 the old familiar EAQ, Madrid, returned to the air. This time as "Radio National de Espana," Radio Madrid, as the national forces of General Franco had just occupied the city.

In addition to EAQ we also heard EAR and another on 7350 kc., all carrying the same programme.

As the political situation changes from day to day in Europe, so also do the chances of logging new stations occur, while old familiar ones come on the air under new call signs. As Italy is now in control of Albania, it is quite possible that the recently inaugurated short-wave station, ZAA, "Radio Tirana," in Albania, may now again be heard, but very likely with the "I" prefix.

Yugoslavia is the only other Balkan country to have a regular short-wave station in operation, though, as previously reported, Rumania is supposed to be on the air from Bucharest, the capital. There is supposed to be a transmitter building in Greece, but we have no details.

FLASH!

Verification received from Radio Saigon Compagnie Generale de Telegraphic Sans Fils. Power, 12 k.w. frequencies, 6116 k.c. and 11,780 k.c. simultaneously, also on 300 metres.

The Darien, Manchukuo station, JOAK. The short wave transmitter JDY is also housed in this modern building.

RADIO SAIGON NOW HEARD

REVIVAL OF FAMOUS OLD-TIMER

Some of our old-timers will remember Radio Saigon, which used to put such a good signal into this country a few years ago.

It has now been off the air for a long time, due, we believe, to economic reasons. These will be pleased to hear of its return. Due, no doubt, to increased power, coupled with our now improved receivers, it puts in an even better signal.

At our location we first heard it on March 18 from 9.40 p.m. till closing at 10.15 p.m.

Announcements were frequently given in both French and English, the latter being as follows, "Hallo, hallo, this is Radio Saigon in French Indo-China, transmitting on 6116 kc. in the 49 metre band. Kindly send your reports to P.O., Box 238, Saigon. We are on the air every day at 11 a.m. and 6.30 p.m., Saigon time (2 p.m. and 9.30 p.m. E.A.S.T.)."

Since that time we have heard it every night, but the address is now P.O., Box 412.

Saigon does not adhere strictly to announced operating hours, as we have heard it as late as 1.15 a.m. when it closed down, the announcer being a lady.

Strength is excellent at all times. The first part of the transmission consists of English and French recordings.

IRELAND ON 31 METRES

"Radio Eireann" Broadcasting

On March 20th we heard a new station which we are practically certain was "Radio Eireann," the new Irish transmitter located at Moydrum, near Athlone, Eire.

At the time of our reception, 7.0 a.m., they were broadcasting a programme of Irish jigs, and other typical Irish dance tunes. This was followed by a talk, and then concluded with an announcement at 7.30 a.m. This transmission was heard on 9595 k.c., 31.27 m. Signal strength was rather poor, but the quality was quite good.

This transmitter was built by the Marconi Co., and is also licensed to transmit on the following additional frequencies: 6190 k.c., 11,740 k.c., 15.120 k.c., and 17,840 k.c.

As we remarked above, we are not positive of this one, but as the frequency is exactly right, reception time appropriate for that country, coupled with the fact that they were playing Irish jigs for over fifteen minutes, we feel it was, in fact, "Radio Eireann."

Reception of their 15,120 k.c. signals has been reported in the U.S.A. some time ago, but we understand the Eire Minister for Posts and Telegraphs is very reticent in giving any details about the station.

Readers should therefore be on the lookout for this one. Any further information we obtain will be published in due course.

When "Radio Eireann" reaches entertainment level, it will be of great interest, not only to the many Irishmen scattered throughout the world, but also to the many other listeners who will undoubtedly enjoy its programme.

The picturesque surroundings of "Radio Vatican." The antenna mast of HVJ is in the background.

TREASURE ISLAND

Now On 31.48m

In last month's issue we gave details of the new General Electric station, W6XBE, located on Treasure Island, and using 15,330 k.c. Reception at that time was weak and not of any real entertainment value.

However, on March 28 they changed over to their other frequency of 9530 k.c., 31.48 m., and we were lucky enough to hear them when they opened for the first time at 10.0 p.m. on that day.

The General Electric Company operates W6XBE on a non-profit basis without charges for services rendered, for the purpose of improving the international broadcast field, furnishing listeners in other countries with programmes which would not otherwise be received, and the building of international goodwill.

LOCATION

For maximum signal at the receiving point from W6XBE, the point of maximum signal pick-up of the receiving antenna should be directed to:—

Latitude: 37 degrees, 49 minutes, 20 seconds north.

Longitude: 122 degrees, 22 minutes, 20 seconds west.

TECHNICAL

The carrier power output of W6XBE on assigned frequencies is 20,000 watts.

The effective carrier power of W6XBE when Alexanderson panel directive antennas are used is 200,000 watts.

The maximum frequency variation from assigned frequencies is 100 cycles per second.

Class B, high-level modulation is used and 100 per cent. modulation is maintained.

15,330 KILOCYCLES

4 a.m. to 7 a.m. (P.S.T.): Beam on Asia (centre: 54 degrees west of true north).

3.30 p.m. to 7 p.m. (P.S.T.); Beam on South America (centre: 54 degrees east of true south).

NEW WAVE LENGTH FOR 9MI

The ever-popular 9MI aboard the M.V. Kanimbla has recently changed wavelength to an announced one of 49.54 m., on which they will transmit until further notice.

We understand this change was mad by the A.W.A. and P.M.G. engineers i order to escape interference with othe stations near their old wavelength 49.917 m. These would most likely b XYO, Rangoon, and HP5K, in Panam

On their new frequency they com pletely swamp W8XAL on 6060 k and ZHJ on 6057 k.c., but will not, course, interfere with these stations locations where their own signals a not at such great strength. From lette we have received from overseas corre pondents we find that 9MI is a ve popular station, and their verificati much sought after.

FLASHES! FROM EVERYWHERE

JAPAN

From April 1 the Japanese authorities will use JZK on 15,160 k.c., in place of JZI.

ITALY

The complete list of short-wave stations of the Prato Smeraldo Centre, Rome, are as follows:—

2RO3, 9630 k.c.; 2RO4, 11,810 k.c.; 2RG6, 15,300 k.c.; 2RO8, 17,820 k.c.; 2RO9, 9670 k.c.; 2RO11, 7220 k.c.; 2RO12, 15,100 k.c.; 2RO13, 11,900 k.c.

RUMANIA

Rumania now has a station operating on 8572 k.c., which transmits from 11.15 p.m. till 1.30 a.m., and also from 7.0 a.m. till 10.0 a.m. Their call being "Radio Bucaresti."

CANADA

The popular Canadian CJRO, in Winnipeg, has now changed its frequency from 6147 k.c. to 6175 k.c., and now operates on Saturdays and Sundays only.

ARGENTINE

LSY3, "La Vox de Argentina," is on the air every Saturday morning from 5.0 a.m. till 5.30 a.m., on a wavelength of 16.56 m. It is quite possible that this one may be heard in Australia.

NAIROBI

VQ7LO, Nairobi, Kenya Colony, has now changed hands, the new owners being the East Africa Broadcasting Co., while the address remains the same, P.O. Box 777 Nairobi.

PARAGUAY

A new country to look out for on the 25 metre band is Paraguay, who have a station, ZP14, Villarica, which transmits on 25.59 m. from around 9.0 a.m. until 9.30 a.m.

NORWAY

Norway now has an additional two stations, LKW on 17,750 k.c., 16.91 m., and LKV on 15,170 k.c., 19.78 m. We doubt if these will now be heard, due to changing conditions.

SWITZERLAND

One of the new Swiss stations has been heard on two occasions on approximately 9570 k.c. around 7.0 a.m. They are usually talking in French, and quality is poor due to a hum on the carrier which makes it very hard to understand.

One of the large loud speaker units in Germany which are used to carry radio and speeches to the people.

ULTRA-HIGH FREQUENCIES

During the last month there has been very little change in U.H.F. reception, with the exception of the 9.4 m. stations which are now very rarely heard at any time.

Despite this, we were lucky enough to log one new one on this band, W4XA, in Nashville, Tenn., on the usual 31,600 k.c. channel. We understand that this station is moving to 25,450 k.c. very shortly, which will make its reception here much easier.

Another new station to listen for on these bands is W2XUP in New York, which uses 25,700 k.c., usually broadcasting facsimile (radio newspaper), but at other times taking the regular programmes of WOR, similar to its sister station, W2XJI.

W3XAU has also been allocated the frequency of 25,725 k.c., but in the meantime will not use it, but may do at a later date. W6XDA has now taken the air on 35,600 k.c., which makes its reception here very difficult.

Stations actually heard during the last month are as follows:—

W8XNU, 25,950 k.c., Cincinnati, Ohio.

W6XKG, 25,950 k.c., Los Angeles, Cal.

W9XTC, 26,050 k.c., Minneapolis, Minn.

W9XJL, 26,100 k.c., Superior, Wis.

W9XUP, 26,150 k.c., St. Paul, Minn.

W2XJI, 26,300 k.c., New York, N.Y.

W9XA, 26,450 k.c., Kansas City, Mo.

W9XTA, 26,500 k.c., Harrisburg, Ill.

W2XQO, 26,550 k.c., New York, N.Y.

W4XA, 31,600 k.c., Nashville, Tenn.

W9XUY, 31,600 k.c., Omaha, Neb.

Listen for these!

OVERSEAS STATIONS NOW AUDIBLE

Here is a list of Short Wave stations which have actually been heard over the last few weeks. Most of these should be heard by any of our Short Wave fans who have a good set and location. Details of each station are given.

NORTH AMERICA

W1XK.—9570 k.c. 31.35 m., Boston, Mass. Heard weakly in the mornings at 7.0 o'clock, and also at night after 10.0.

W1XAL.—11,790 k.c., 25.45 m., Boston, Mass. Comes in well towards 8.0 a.m., and has some interesting programmes.

W2XE.—11,830 k.c., 25.36 m., New York. Another one which is heard well in the mornings around 8.0. This station can also be heard occasionally on its other frequency of 9650 k.c.

W2XAF.—9530 k.c., 31.48 m. Can now be heard shortly before they close at 3.0 p.m. Station located at Schenectady, N.Y.

W2XAD.—9550 k.c., 31.41 m. Same location. Heard on one occasion from 8.0 p.m. onwards. Their other frequency is 15,330 k.c., and they can be heard there in the early mornings.

W2XE—6120 k.c., 49.02 m., New York, U.S.A. This one is now heard in the afternoon until they close at 4.0 p.m., when they announce their various frequencies and times on the air.

W3XAL.—9670 k.c., 31.03 m., New York. This station is quite strong until they close at 4.0 p.m., and they can also be heard weakly when opening at 8.0 a.m.

W3XAU—15,270 k.c., 19.65 m., Philadelphia, Pa., U.S.A. Heard in the forenoon until they close down at 10.0 a.m., announcing they will open in three-quarters of an hour on 6060 k.c.

W3XL.—17,780 k.c., 16.87 m., New York. Can be heard at quite good strength in early a.m., also on some occasions well into the forenoon.

W4XB.—6040 k.c., 49.65 m., Miami, Florida. This station can now be heard every Sunday afternoon till they close at 5.0 o'clock, when they close with announcement in English and Spanish. They relay broadcast band station WIOD.

W6XBE.—9530 k.c., 31.48 m., Treasure Island, Cal. Information on this one covered in separate article. They can also be heard on their 15,330 k.c. frequency till they close at 1.0 p.m. This is a special transmission for South America. An interesting point re this frequency is, we have also heard them on their harmonic of 30,660 k.c.

W8XK.—6140 k.c., 48.83 m., Pittsburg, Pa. Can be heard till closing at 4.0 p.m. on this frequency and on their other frequency of 11,870 they put in a nice signal in the early mornings, while they can again be heard on 15,210 k.c. when opening at 11.15 p.m. and sometimes midnight.

W8XAL.—6060 k.c., 49.5 m., Cincinnati, Ohio. This one is now very good at night, while they are also quite strong till they close in the afternoons at 5.0.

XEXA.—6175 k.c., 48.6 m., Mexico City, Mexico. Opens up at good strength nightly with "March of the Toys" selection, and then gives physical exercises. Opening time is usually 10.30 p.m.

XEWW.—9500 k.c., 31.58 m., Mexico City, Mexico. Always a good signal from around 11.0 p.m., and can also be heard now in the afternoons till closing at 3.0 p.m., and sometimes later.

XETW.—6045 k.c., 49.6 m., Tampico, Mexico. This is a very erratic station, as sometimes it is heard quite well on opening at 11.0 p.m., while the next night it is practically dead.

XECU.—6080 k.c., 49.34 m., Guadalajara, Mexico. A very powerful Mexican which opens at midnight and sometimes earlier. Uses a three-toned chime, but only speaks Spanish.

CJRO.—6175 k.c., 48.61 m., Winnipeg, Man., Canada. Quite a strong signal on a Sunday afternoon till 5 o'clock. Address is James Richardson and Sons, Ltd.

CFRX.—6070 k.c., 49.42 m., Toronto, Ont., Canada. Appears to have weakened considerably from last month, and some nights not heard at all.

CHNX.—6130 k.c., 48.94 m., Halifax, N.S., Canada. Only heard on one occasion last month with usual religious service followed by physical exercises.

CENTRAL AMERICA AND WEST INDIES

COCQ.—8810 k.c., 34.0 m., Havana, Cuba. Still wandering about around this frequency, and still a good signal.

COCH.—9437 k.c., 31.8 m., Havana, Cuba. Heard both in the mornings and also on opening at 10.0 p.m.

COBZ.—9030 k.c., 33.32 m., Havana, Cuba. Very weak now at nights, and barely audible in the afternoons.

COCD.—6130 k.c., 48.94 m., Havana, Cuba. Only heard on one night last month, opening at 11.0 p.m. with "In a Clock Store."

COCX.—11,740 k.c., 25.55 m., Havana, Cuba. Opens nightly at 11 o'clock, and also heard on Sundays till closing at 4.0 p.m.

COCW.—6330 k.c., 47.34 m., Havana, Cuba. Becoming stronger at night, when they open at 9.55 p.m. Very bad hum on carrier makes it easy to identify.

COCM.—9833 k.c., 30.52 m., Havana, Cuba. Another 11.0 p.m. opening, and also audible in afternoons till 3.0 p.m.

COBC.—9990 k.c., 30.01 m., Havana, Cuba. This one is usually the loudest Cuban at night, and can easily be identified by their slogan, "El Progresso Cubano."

COGF.—11,800 k.c., 25.41 m., Matanzas, Cuba. This one has not been heard for a long time, but is now audible on opening at 11.0 p.m.

TG2.—6190 k.c., 48.4 m., Guatemala City, Guatemala. One of the regulars at night, and also heard on a Sunday afternoon till 6.0 p.m.

TGWB.—6490 k.c., 46.2 m. Same location. Opens nightly at 10.40 p.m., and also has physical exercises.

TGWA.—15,170 k.c., 19.77 m. Same location. Heard every Monday morning around 7.0 o'clock. They were also heard on their 9685 k.c. frequency till closing at 2.40 p.m. on 26/3/'39.

TI4NRH.—9670 k.c., 31.03 m., Heredia, Costa Rica. This is their assigned frequency, but they are actually on 9690 k.c., when heard on a Sunday night.

TIPG.—9690 k.c., 31.03 m., San Jose, Costa Rica. "La Vox de la Victor." This is a new frequency for this station, and they now open nightly at great strength at 10.0 o'clock with announcements in Spanish and English. Play a great number of Hill and Dale recordings. They have evidently discarded their 6410 k.c. frequency.

"RADIO MARTINIQUE."—9700 k.c., 30.9 m., Fort-de-France, F.W.I. This one is now quite good strength on Monday morning till they close with the Marseillaise at 7.0 o'clock. Easily identified by their six or seven toned chime.

HP5A.—11,700 k.c., 25.65 m., Panama City, Panama. Always a good on after 11.0 o'clock every night.

HIN.—6243 k.c., 48.0 m., Ciudad Trujillo, Dominican Republic. Has weakened somewhat since we last reported them but can still be heard opening at 9.4 p.m. There is now no sign of the other transmission on 12,500 k.c.

Listen for these!

(Continued from Previous Page)

HP5K.—6005 k.c., 49.96 m. Same location. Opens nightly with the "Merry Widow" Waltz, and now has a lady announcer who gives all announcements in English, advertising various articles between each item.

SOUTH AMERICA

RX.—9660 k.c., 31.06 m., Buenos Aires, Argentine. This station is now used instead of LRU on the 19 m. band, and opens nightly at 10.0. Can also be heard till closing at 5.0 p.m. on a Sunday afternoon.

QA.—9700 k.c., 30.9 m., Buenos Aires, Argentine. Heard in special transmission, as mentioned in article.

RU.—15,290 k.c., 19.62 m. Same location. Heard at fair strength one morning at 1.0.

XA2.—6000 k.c., 50.0 m., Montevideo, Uruguay. Special transmission for Pope's coronation, as covered elsewhere.

XA8.—9640 k.c., 31.12 m. Same location. Always a good signal on Sunday afternoons till their closure at 5.0. Announces as "Radio Belgrano."

B960.—9600 k.c., 31.25 m., Santiago, Chile. Mentioned in article.

B970.—9730 k.c., 30.85 m., Valparaiso, Chile. Mentioned in article.

B1170—11,700 k.c., 25.65 m., Santiago, Chile. This Chilean, which was heard so well last year, has now again become audible, and can be heard quite well until closing on a Sunday afternoon at 1.30 with a very brisk march. Their address is Casilla 706.

B1174—11,740 k.c., 25.55 m., Santiago, Chile. This is a new station, and we heard it for the first time on Sunday, April 9. From 1.0 p.m. until 1.15 p.m. a news service in Spanish is given, and then dance numbers with chorus in English until they close at 1.30 p.m. with announcement first in Spanish and then in English. Address is Casilla 3455, Santiago, Chile.

B1180.—11,990 k.c., 25.04 m., Santiago, Chile. Details in the mystery station panel.

B1190—11,900 k.c., 25.21 m., Valdivia, Chile. Another one which was very consistent last winter in the early afternoon. Can now be heard, closing at 1.0 p.m. on Sunday with announcement in Spanish only. They have still not answered our report of last year.

YV1RD.—6070 k.c., 49.42 m., Maracaibo, Venezuela. Quite a good signal now on opening at 9.0 p.m. or thereabouts.

YV1RB.—5850 k.c., 51.28 m. Same location. Their strength is now much better, and can be heard quite well some nights, just after they open at 8.45.

YV1RH.—6360 k.c., 47.17 m. Same location. This is the strongest of the Venezuelans, and is heard best around 10.0 p.m.

OAX4T.—9562 k.c., 31.37 m., Lima, Peru. They are now back on this frequency, and open at great strength every night at 10.0.

OAX5C.—9350 k.c., 32.08 m., Ica, Peru. Heard once on Sunday, March 26, till they closed at 3.0 p.m. with announcement in Spanish and English. Very slow in verifying.

HCJB.—12,460 k.c., 24.8 m., Quito, Ecuador. Still opening at 10.0 p.m., but nowhere the strength they were last month when they were one of the strongest stations on the air.

LRA1.—9690 k.c., 30.94 m., Buenos Aires, Argentina. This station, whose title is "Radio del Estado," can now be heard opening at 8.0 a.m., but is rather weak as yet. They send a nice card, and address is Palacio de Corroes y Telegrafos. Buenos Aires, Argentine Republic.

MYSTERY

FROM our first list of unidentified stations in the April issue, we are now able to remove the one on 11,990kc. 25.04m. which we had listed as being in Santiago-de-Cuba. We have now identified it as CB1180 in Santiago, Chile. The address being Soc. Nacional de Agricultura, Casilla 40D Santiago.

The Scandinavian on 9,610kc. appears to be a Norwegian, as we have now heard it transmitting the same programme as LKQ on 11.740kc., 25.56m. though as yet we do not know its call letters.

We have one new one to add to the panel this month as follows:

6,500kc. 46.1m. A Spanish speaking station which opens nightly at 9.10 p.m. with march followed by opening announcement in Spanish. Considering the opening time, it is almost certainly located in the Dominican Republic as their hour is exactly at ten minutes past the hour our time.

Others carried forward from last month are listed briefly again.

7,200kc., 41.67m. Opens nightly at 9.0 p.m. closes 11.15 p.m.

15,300kc., 19.61m. Opens nightly at 7.0 p.m. closes 7.25 p.m.

9,850kc., 30.45m. Heard at various times in early morning and closes at 6.35 a.m. with announcement in English.

An invitation is again extended to readers to help in identifying these stations, also to send in a list of any which may be puzzlying them, so that all our listeners can assist in finding their correct call letters and location.

STATIONS!

AFRICA

ZRO.—9740 k.c., 30.80 m., Durban, South Africa. Since writing the item re. this station in "Flashes From Everywhere," we succeeded in logging it on April 7 from 1.15 a.m. until 2.15 a.m. They are supposed to be on 9753 k.c., but were actually on 9740 k.c.

ZRJ.—6007 k.c., 49.94 m., Johannesburg, S.A. Still heard in the mornings till 7.0.

ZRK.—6097.5 k.c., 49.2 m., Capetown, S.A. Still heard weakly in the mornings till 7.0. Their other frequency, 9615 k.c. gives a much better signal just after 1.0 a.m.

CR7AA.—6137 k.c., 48.87 m., Lourenco Marques, Mozambique. Hardly as good a signal as it was last month, but still easily heard till closing at 7.0 a.m.

VQ7LO.—6082 k.c., 49.31 m., Nairobi, Kenya. Just before 5.0 a.m. this is one of the strongest signals on the 49 metre band.

"Addis Ababa."—9650 k.c., 31.09 m., Addis Ababa, Ethiopia. When they open at 2.0 a.m. they are one of the strongest stations on the 31 metre band.

"Radio Tananarive."—6060 k.c., 49.5 m., Tananarivè, Madagascar. This station opens at 1.0 a.m. with the Marseillaise, and now also uses one of their other frequencies, 9690 k.c., simultaneously, the latter being much the best.

EA9AH.—6980 k.c., 43.0 m., Tetuan Spanish Morocco. This is a new frequency for this station, and was heard working there one morning at 7.0.

INDIA AND ASIA

VUD3.—9590 k.c., 31.28 m., Delhi, India. Has a very loud signal every night by midnight.

VUD4.—15,290 k.c., 19.62 m., Delhi, India. Quite a good signal around midday, but usually all native type music.

VPB.—6160 k.c., 48.6 m., Colombo, Ceylon. Comes on the air at 11.0 p.m., and usually a lady announcer.

KZRM.—9570 k.c., 31.35 m., Manila, Philippine Islands. Always a good signal at night, and can now also be heard in the mornings, opening at 7.30.

KZIB.—9500 k.c., 31.58 m., same location. This is now one of the regular entertainment stations on this band.

ZBW3.—9525 k.c., 31.49 m., Hongkong, China. Quite strong after 10.0 p.m., but now suffers a bit from W6XBE.

ZHJ.—6057 k.c., 49.51 m., Penang, S.S. Very much weaker now, but heard best just before closing at 11.40 p.m.

ZHP.—9690 k.c., 30.94 m., Singapore, S.S. Heard every night, but is now practically obliterated when TIPG opens up at 10.0 p.m.

HS6PJ.—9500 k.c., 31.58 m., Bangkok, Siam. Heard on Monday and Thursday nights after 11.0, with frequent announcements in English.

YDA.—6045 k.c., 49.6 m., Tanjong Priok, Java. Heard every night, but not very strong.

YDC.—15,150 k.c., 19.8 m., Bandoeng, Java. Still holding a good signal at night, and can also be heard at 9.0 a.m.

PMH.—6720 k.c., 44.64. m., Bandoeng, Java. Always a loud one at night, and quite enjoyable at times.

PLP.—11,000 k.c., 27.27 m., same location. One of the regular night stations, and always a good level.

PMN.—10,260 k.c., 29.24 m. Same remarks as for PLP.

"Radio Philco."—11,770 k.c., 25.49 m., Saigon, French Indo China. On some nights this station is good, while on others is practically inaudible.

Saigon.—6210 k.c., 48.28 m. A very poor distorted signal, and of no entertainment value.

"Radio Saigon."—6116 k.c., 49.05 m., Saigon. Covered elsewhere.

XYO.—6007 k.c., 49.94 m., Rangoon, Burma. On the air nightly, but very near the "death ray" which blots out this part of the 49 metre band.

JIB.—10,535 k.c., 28.48 m., Taihoku, Taiwan. English news by lady every night at midnight.

JFO.—9625 k.c., 31.16 m., same location. Heard simultaneously, but not so strong.

JDY.—9940 k.c., 30.18 m., Darien, Manchuquo. On the air every night at 10.0, and gives news in English.

JLT.—6190 k.c., 48.4 m., Tokio, Japan. Open nightly at 11.0, but very often interfered with by VIS with morse.

JLT2.—9645 k.c., 31.1 m., same location. Heard at good strength until closing at 7.0 a.m.

JLT3—11,705 k.c., 25.63 m., Tokio, Japan. This is a new station, which works in conjunction with JLT2 on 9645 k.c. It is exceptionally strong at 6.0 a.m., but gradually weakens till closing at 7.0 a.m.

JLG.—7288 k.c., 41.02 m., same location. Used with JLT2.

JZI.—9535 k.c., 31.46 m. Same location. Was used in the 10.0 p.m. session until the end of March.

JZK.—15,160 k.c., 19.79 m. This station now carries the session starting at 10.0 p.m.

JZJ.—11,800 k.c., 25.42 m. During first part of March this one was used opening at 11.0 p.m.

JVN.—10,660 k.c., 28.14 m. Heard every night with Japanese programme, also news in English at 7.55 p.m.

JVE.—15,660 k.c., 19.16 m. Working with Bangkok, Siam.

XGOX.—15,190 k.c., 19.75 m., Chengking, China. Occasionally heard around 10.0 p.m.

XGOX—17,820 k.c., 16.84 m., Chengking, China. This one is now heard on the 16-metre band between 1.0 p.m. and 2.0 p.m. News session in English was given at 1.45 p.m.

XGXA.—6980 k.c., 43.0 m., same location. Good signal every night, with lady announcer.

XGX.—9300 k.c., 32.26 m. Believed now to be in Shanghai, and audible every night around 10.0.

XGOY.—11,900 k.c., 25.21 m., Chengtu. A very loud signal from this one, which was using 9500 k.c. during the first part of March.

XMHA.—11,850 k.c., 25.32 m., Shanghai. This station is wandering all around the 25 metre band, and has also been heard on 11,930 k.c., and 11,960 k.c., besides its original one of 12,280 k.c. News bulletin at midnight.

AUSTRALIA AND OCEANIA

VK2ME.—9590 k.c., 31.28 m., Sydney, N.S.W. Heard at full speaker strength every Sunday when they are on the air.

VK3ME.—9500 k.c., 31.58 m., Melbourne, Vic. Comes on the air nightly at 7.0, and is now usually very weak.

VK6ME.—9590 k.c., 31.28 m., Perth, W.A. Opens at 9.0 p.m., and is quite good when not interfered with by VUD3.

VLR.—9580 k.c., 31.32 m., Lyndhurst, Vic. Excellent strength on opening at night, but rapidly fades to nothing.

VK9MI.—6055 k.c., 49.54 m. When on the air has a very strong signal, but poor quality, and spreads over the band.

VLR3.—11,880 k.c., 25.25 m., Lyndhurst, Vic. During their daytime transmission this station is excellent.

VPD2.—9535 k.c., 31.46 m., Suva, Fiji. Heard nightly until they close at 10.0. Not as good as they were last month.

FK8AA.—6120 k.c., 49.0 m., "Radio Noumea," Noumea, New Caledonia. Heard on Wednesdays and Saturdays from 5.30 p.m. till 6.30 p.m. with quite a good signal.

ZMBJ.—8840 k.c., 33.5 m. The Awatea, trading between Sydney and New Zealand. Heard on two occasions with very strong signal at 4.30 p.m.

ENGLAND

GSA.—6050 k.c., 49.59 m., London. Fairly strong signal, but rather noisy till closing at 7.0 a.m.

GSB.—9510 k.c., 31.55 m. Now used in No. 1 transmission, and comes in at great strength.

GSC.—9580 k.c., 31.32 m. This one is equal to GSB in the session closing at 7.0 a.m.

GSD.—11,750 k.c., 25.53 m. Heard at great strength in No. 1 transmission and also after midnight.

GSE.—11,860 k.c., 25.29 m. This one heard at various times, but probably best around 7.0 a.m.

GSF.—15,140 k.c., 19.82 m. Always a good signal in the No. 1 transmission

GSG.—17,790 k.c., 16.86 m. This one not too good now in the early part of No. 1 session, but improves later.

GSH.—21,470 k.c.; 13.97 m. Practically inaudible until around midnight, when it improves.

GSI.—15,270 k.c., 19.66 m. Another very good station in the 4.30 p.m. to 6.30 p.m. transmission.

GSJ.—21,530 k.c., 13.93 m. This one also is very weak until just before midnight.

GSO.—15,180 k.c., 19.76 m. A very loud signal, but suffers from interference from the Russian, RV96.

GSP.—15,310 k.c., 19.62 m. Heard weakly on one morning, just before 7.0.

GSV.—17,810 k.c., 16.84 m. This one is the best on the 16-metre band at night

ITALY

12RO3.—9630 k.c., 31.13 m., Rome, Italy. A real entertainment station in the early mornings.

12RO4.—11,810 k.c., 25.4 m. Another one heard well at 7.0 p.m.

12RO6.—15,300 k.c., 19.61 m. Usually one of the strongest Italian stations when on the air: heard frequently at 7.0 a.m.

12RO8.—17,820 k.c., 16.84 m. Comes in well about 11.0 p.m.

12RO9.—9670 k.c., 31.02 m. Carries same programme as 12RO3 in the early morning, but not quite so loud.

12RO12.—15,100 k.c., 19.87 m. Heard well one night at 10.0 p.m.

NEW STATIONS

In this panel each month will be listed all stations not previously reported which have been heard by readers or at our own location during the preceding month.

K.c.	Metres.	Call.	Location.
6.000	50.00	CXA2	Montevideo, Uruguay.
6.040	49.67	W4XB	Miami, Florida, U.S.A.
6.080	49.34	XECU	Guadalajara, Mexico.
6.116	49.05	Radio Saigon	Saigon, French Indo China.
6.120	49.02	W2XE	New York, U.S.A.
9.530	31.48	W6XBE	Treasure Island, Cal.
9.595	31.27	Radio Eireann ?	Moydrum, Eire.
9.600	31.25	CB960	Santiago, Chile.
9,690	30.94	TIPG	San Jose, Costa Rica.
9,690	30.94	Radio Tananarive	Madagascar, Africa.
9.690	30.94	LRA1	Buenos Aires, Argentine.
9.730	30.82	CB970	Valparaiso, Chile.
9,740	30.80	ZRD	Durban, South Africa.
11.705	25.63	JLT3	Tokio, Japan.
11.740	25.55	CB1174	Santiago, Chile.
11.900	25.21	XGOY	Chengking, China.
15,310	19.60	LYZ4	Kaunas, Lithuania.
17,820	16.84	XGOX	Chengking, China.
17,850	16.80	TPB3	Paris, France.
31,600	9.49	W4XA	Nashville, Tenn., U.S.A.

IRF.—9230 k.c., 30.52 m. This one heard at various times, and when on the air around 6.0 p.m. is very loud.

IQY.—11,670 k.c., 25.70 m. Occasionally used in special transmission, and heard once at 11.0 p.m.

GERMANY

DJB.—15,200 k.c., 19.74 m. A very popular transmitter, which gives an excellent signal at 5.0 p.m., and by midnight is the loudest station on the 19-metre band.

DJC.—6020 k.c., 49.83 m. Heard every morning until closing at 7.20 a.m.

DJD.—11,770 k.c., 25.49 m. Only fair at 7.0 a.m., and also at 2.0 p.m.

DJE.—17,760 k.c., 16.89 m. Quite good around midnight, but not as strong as last month.

DJL.—15,110 k.c., 19.85 m. Heard weakly between 11.0 p.m. and midnight.

DJN.—9540 k.c., 31.45 m. This one is the best German station on the 31 metre band, and is heard at excellent strength at 11.0 p.m.

DJQ.—15,280 k.c., 19.63 m. Heard at excellent level at 5.0 p.m.

DJR.—15,340 k.c., 19.56 m. Puts in a nice signal at 1.30 p.m.

DJX.—9675 k.c., 31.01 m. This comparatively new transmitter is excellent every morning at 7.0 o'clock, and probably earlier.

TURKEY

TAQ.—15,190 k.c., 19.75 m., Ankara, Turkey. Now being heard well around 10.0 p.m. Closes at 11.0 p.m.

TAP.—9465 k.c., 31.70 m. Same location. This is one of the strongest stations on the 31-metre band in the morning, and plays all English type recordings at that time.

FRANCE

FPA2.—15,243 k.c., 19.68 m., Paris, France. Can still be heard opening at 9.0 p.m., but not so strong as previously.

FPA3.—11,885 k.c., 25.24 m. Quite strong in the early mornings.

FPA4.—11.718 k.c., 25.6 m. Good strength until closing at 3.0 p.m.

FPB3.—17,850 k.c., 16.81 m. Opens at good strength at 12.30 a.m. This station is actually listed as being on 17,810 k.c., so it may or may not be the same.

FPB7.—11,885 k.c., 25.24 m. Heard well till closing at 3.0 p.m.

FPB11.—15,130 k.c., 19.83 m. Quite a nice signal at 5.30 p.m.

FPB?.—7280 k.c., 41.21 m. Now used in the early morning session and heard at good strength.

RUSSIA

RV96.—15,170 k.c., 19.76 m., Moscow, U.S.S.R. A terrific signal is sent out around 5.0 p.m.

RV96.—15,400 k.c., 19.47 m. Very loud at 9.0 p.m.

RV26.—9520 k.c., 31.5 m. This one is very loud in the mornings at 7.0 a.m. and also at night around 11.0 p.m.

RV96.—6812 k.c., 44.04 m. This is a new transmitter and is quite good at 10.0 p.m. There is also another Russian on 10.280 k.c., which carries the same programme.

RV96.—6030 k.c., 49.75 m. Very loud in the early morning, and also at midnight.

STOP PRESS!

NEW DAVENTRY TRANSMITTER

On April 15 we heard for the first time a new Daventry transmitter, which operates on 9600 kc., 31.25 m., under the call of GRY. This transmitter is used in the No. 4 transmission until 7.0 a.m., and also in the second half of the same session commencing at 7.20 a.m. The announcer, on giving the call GRY, mentions "Y" for York in order to identify it. Strength is rather poor, and not nearly as strong as the other two transmitters on the same band. The call letters are unusual, inasmuch as all the other Daventry stations use calls starting with "GS."

DUTCH NEW GUINEA

On Sunday, April 16, we heard a station in Hollandia, Dutch New Guinea, using the call PO6ZA, transmitting a special programme to Bolinas, Cal. This was evidently for rebroadcast in the United States. Prior to the start of the programme, the announcer was calling test, and gave the frequency as 27,980 kc., which is approximately 10.72 m. This station is evidently one attached to the Archbold Expedition, which is at present located in Hollandia.

IMPROVED U.H.F. RECEPTION

During week ending April 15 both the 9 and 11 metre U.H.F. broadcast bands improved remarkably, reception being excellent most mornings around 7.0 a.m. On the 14th we succeeded in logging W1XKA in Springfield, Mass., on 31,600 kc., 9.49 m., when they were rebroadcasting WBZA. As this station uses only 50 watts, it shows how this band had opened up. Two other stations heard at good strength on the same frequency were W4XCA in Memphis, Tenn., and W9XPD in St. Louis, Miss.

W4XA, in Nashville, Tenn., which we show in U.H.F. notes as being heard on 31,600 kc., has now been heard on 26,150 kc. at very much better strength. They open at 10.30 a.m., and we listened to a really enjoyable musical programme for nearly an hour before strength faded. Down on 7 metres we heard VK2MA at great strength on Sundays, their frequency being 42,860 kc.

IRELAND VERIFIED

Verification received from "Radio Eireann." On the air from 11.30 p.m. till 1 a.m. on 17,840 kc., also from 3.30 a.m. till 7.30 a.m. on 17,840 kc. and 9595 kc. on alternate days.

HOLLAND

PCJ.—9590 k.c., 31.28 m., Huizen, Holland. Heard closing one Tuesday morning at 6.0 a.m., when signal was very good.

PCJ2.—15,220 k.c., 19.71 m. Same location. In their special Australian transmission on Tuesday evenings from 6.0 p.m. to 7.30 p.m., they are heard well.

PH12.—17,770 k.c., 16.88 m., Can be heard weakly at 11.0 p.m.

MISCELLANEOUS

ORK—10,330 k.c., 29.04 m., Ruysselede, Belgium. Now being heard at quite good strength, and with some excellent musical numbers, between 5.30 a.m. and 6.0 a.m.

CSW2.—11,040 k.c., 27.17 m., Lisbon, Portugal. Every morning this station can be relied upon to give real entertainment.

CSW4.—15,130 k.c., 19.83 m. Same location. Can still be heard every night opening at 10.0 p.m. with chimes of 12 noon.

CS2WD.—5977 k.c., 50.15 m. Same location. Not heard for some time, but now audible every morning around 7.0 a.m. with quite a good signal. Sends a nice verification card. Their address is Rua Capello 5, Lisbon, Portugal.

LYR.—9300 k.c., 32.27 m., Kaunas, Lithuania. Listen for this one on a Sunday afternoon when they open at 4.30 p.m. with a piano signal tune of about 10 notes. Quite good strength.

LKQ.—11,740 k.c., 25.55 m., Jeloy, Norway. Heard in the early morning carrying the same programme as LKJ on 6130 k.c.

LK?.—9610 k.c., 31.22 m. This one is the mystery station of last month, and heard every morning from 6.0 a.m.

OZH.—15,165 k.c., 19.78 m., Shamlebaek, Denmark. Only heard on one night last month at 11.30 p.m. and very weak.

SBP.—11,705 k.c., 25.63 m., Motala, Sweden. Heard weakly at 7.0 a.m., but opens at very good strength with English announcement at 5.58 p.m. on Sunday afternoon.

SBO.—6065 k.c., 49.46 m. Same location. Now being heard every morning opening at 7.15 a.m.

YUA.—6100 k.c., 49.18 m., Belgrade, Yugoslavia. Can now be heard in the mornings, but is greatly interfered with by ZRK.

RR6.—11,991 k.c., 25.04 m., Vitoria, Spain. On some mornings can be heard giving an English news service just before closing at 5.15 a.m.

EAQ.—9860 k.c., 30.43 m., Madrid, Spain. Only heard once this last month in the broadcast on the day Madrid was occupied by the Nationalist forces.

EAR.—9480 k.c., 31.65 m. Same location. Heard in the same broadcast as over EAQ.

"Radio Berne."—9550 k.c., 31.41 m., Berne, Switzerland. This one is only on the air occasionally, but can be recognised by the bad hum on their carrier.

SP31—9525 k.c., 31.49 m., Warsaw, Poland. "Polskie Radio," as this one is called, is heard at fair strength until 6.0 a.m., but still interfered with by the Russian.

SP48—6140 k.c., 48.83 m., same location. Heard at same time as SP31. English announcement by lady at 6.0 a.m.

JIMMY WALLACE, Australia's youngest juggler, balances three sticks with spinning dishes on his chin, a small spinning tray on one finger, and juggles two balls—all at the one time. But this is nothing, he . . . .

. . . . even takes battle axes in his stride too. Tennis rackets, balls, clubs, axes, lamps, cannon balls, billiard cues—anything he can pick up is likely to go spinning in the air. Even blindfolded Jimmy just keeps on going.

Young Boy Juggler

JIMMY WALLACE STARS AT FOURTEEN

I ALWAYS like to hear of the success of the younger boys who devote their spare time to this interesting and absorbing hobby. On this page you will see young Jimmy Wallace, who, at 14 years of age, is Australia's youngest juggler.

Jimmy called in to see me one day last week, and I have persuaded him to give us a few short-cut hints to juggling for our next issue.

For one so young as Jimmy, his past achievements are remarkable, and show what interest, tenacity, and concentration can do for one who gives his time to conjuring, magic, and juggling as a hobby.

Three hours' practice every day, juggling ping-pong balls to battle-axes, and juggling battle-axes is more than a boy's job. He is the only juggler in Australia to handle axes whilst blindfolded. Not being content with juggling, Jimmy is also an efficient magician, ventriloquist, and even presents his own Punch and Judy show.

Next month he will explain ball juggling, and show you how you can accomplish with practice some of the extraordinary feats he performs on the stage.

M A G I C

In the big cities, in almost every country of the world, magicians gather together in their own exclusive clubs. Many of them have their own club rooms, publish their own magazines, have large libraries of magic books and literature, and produce their own Magical Revues regularly.

IN Sydney there is a Magicians' Club where professional and amateur magicians gather together to discuss their profession or hobby. Other cities in Australia and New Zealand also have their Magic Clubs. The clubs do quite a lot for magic, and many pleasant evenings for their enthusiastic members and friends are arranged frequently. If you live near Sydney, or in any other city, and do not know where your local club is situated, drop me a line and I will endeavor to put you in touch with one of their executive members, when, no doubt, you will be furnished with full particulars regarding their functions and membership. The Sydney Club is known as "The Imps," and they meet usually once each month. They produce their own Magical Revues periodically, when advance amateurs and professionals appear. T those who prove themselves efficier entertainers and are otherwise worth diplomas are issued. An initiation cer mony is necessary for all new member wherein they are called upon not expose the magical secrets of tricks ar illusions known to them.

The Imps publish their own 16-pa magazine, "The Imp," monthly, and is always packed full of interesti notes, reading, photographs, drawing tricks, and other items of special inte est to magicians and their membe Those taking up magic as a hobby wou be well advised to seek membership a suitable club wherein you will me those folk who are interested in th fascinating pastime.

QUICKNESS DECEIVES THE EYE! BUNKUM!

Here our magic friend explodes an old fallacy about magic which most of us believe to be fact.

Have you ever heard the saying: "The quickness of the hand deceives the eye?" No doubt you have. Have you ever paused to think about it, and wonder if it is actually true? Perhaps not. You accept what you are told without further thought or investigation. Then, before you read any further, just stop and give these few words a little thought in their relation to conjuring and magic: "The quickness of the hand deceives the eye." Think about it. Analyse it. Is it true?

Now, what is your summing up? Are the words true, and DOES the quickness deceive the eye? Frankly, this is a time-worn fallacy that never has been, and I doubt if it ever will be, true. You have only to give a little thought to this phrase, and you will realise that any "quickness" will have the reverse effect—that is of attracting the eye.

MISDIRECTION, THE REAL SECRET

Magicians in the past have allowed these words to go unchallenged, and I suppose I can quite easily say "Why not?" What does it matter to the onlooker what he thinks? His entertainment and the effect of the trick is all that matters so far as he is concerned. To the magician who gives a little deeper thought to his art, he knows the real secret—not the quickness of any sleight-of-hand move, and not the special apparatus he might have, but the art of misdirection. This is the true basic secret of all magical problems. Actually, the performer must become an actor, acting the part of a magician. It necessarily follows then that the better the actor the better the magician.

From time to time I will illustrate what is meant more clearly by misdirection in the presentation of various tricks. For the present, I will confine myself to giving you problems that are effective in themselves, and require very little "building up" in the form of actual misdirection.

Hey Presto!

Hey Presto! Abracadabra!

Greetings Magicians. How's Tricks?

This month, I bring to you news of special interest. Actually it is more like real magic than anything you could wish for. I have arranged for Magic notes of outstanding interest to be sent to me regularly from the four corners of the earth, specially for your benefit. The latest in magic from England, America, the Continent and other countries will be published in our future issues. Personal experiences of great Magicians in the search for hidden mysteries, tricks of the ancients and tricks of the moderns, stories of the Indian Rope trick and a hundred-and-one interesting Magic items will be presented month by month.

In addition, commencing with this issue, I intend to feature a "Who's Who" in Magic column, of special interest to Australians, together with one photograph each month of some prominent Australian or World-wide Magician of note appearing in Australia. Thus, you will get to know "Who's Who" in the world of Magic, not only in Australia, but in all parts of the world.

Next month, I want to tell you something of the Hobbies Magic Club we are going to form, and how you can become a member and partake of the many advantages.

In the meantime, if you want any further information about Conjuring or Magic, write to me c/o "Radio and Hobbies in Australia," Box 3366 PP., G.P.O., Sydney, not forgetting to enclose a stamped addressed envelope for reply.

With best wishes. Yours for Magic,

Barry Kent.

VENTRILOQUISM
SOME SIMPLE HINTS

In the art of ventriloquism, misdirection is used to a considerable degree, and the success of any performer as a ventriloquist depends on his ability to misdirect. The performer "throwing his voice," as it were, in a certain direction, usually towards a dummy doll, looks in the direction of the supposed voice, anticipating conversation to come from the dummy. On the performer's ability to convey to the audience, by acting or misdirection, that the doll is really speaking, depends his success.

It would not be possible for me to give you in these few pages a full course in the art of ventriloquism. There are many courses and books available, and all I have read are quite good. With a little practice and sincere application on your part, you, too, can learn this fascinating art, and will be able to "throw your voice" into a trunk, under the bed, behind the door, under the table—anywhere; it is not difficult. But, like most things, if you want to become expert, practice and more practice, is necessary.

CHANG!

HERE you see "Chang," the Mysterious and enigmatic personality from the Orient, now appearing in Australia. Chang presents a complete two-and-a-half-hour colorful performance, transplanting the audience to the regions of mystery. Truly, a great Magician, and one whose show you should not miss if he comes your way. You will not be disappointed. He presents a fantastic mystery performance entitled "A Trip to Hades," in two acts, with everchanging scenes and costumes. A large staff of uniformed and costumed stage assistants constantly aid Chang in his numerous tricks and illusions, both large and small. Chang has that rare ability of being able to present a comparatively small trick in a full stage setting and making it as big as his biggest illusion. The general public are magnificently entertained, and all magic enthusiasts appreciate his artistic ability and superb showmanship.

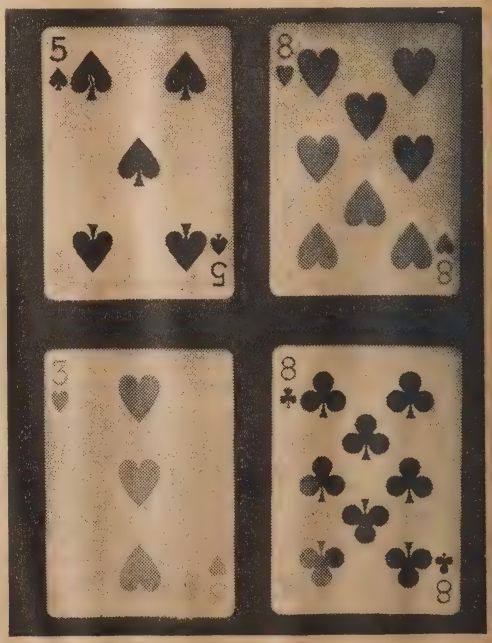
.Next Month in "Who's Who"—

Maurice Rooklyn

How to remove the paper and leave the penny? Easy. As in the first picture, strike the paper sharply with your finger. The second picture shows what happens.

TWO SIMPLE PARLOR TRICKS

Which card was reversed in your absence? The eight of hearts. In the first picture, five hearts point upwards. In the second, they point down! Same idea is used with other cards.



MEPHISTO'S MATCH TRICK

A GOOD ONE WITH A BOX OF MATCHES AND A PENNY

HERE is an interesting problem you will have much fun with. Get a box of safety matches, a penny and two unused wooden matches. Place the box on the table, with the penny and matches arranged as shown above. Be sure the matches are firm and that the two heads are together.

Now ask your friends to remove the penny without touching or knocking down either match. No; they cannot do it.

The only possible way is to set fire to the leaning match. The heads will stick together, and when burned out the slanting match rises slowly into the air.

The penny can now be removed without touching either match.

THE BEWITCHED EGG

Simple and Efficient

Another mystery that appears to upset the ordinary laws of nature. Ask your friends if they can balance an uncooked egg on its end (as shown). Try as they will they cannot succeed—only you can do it.

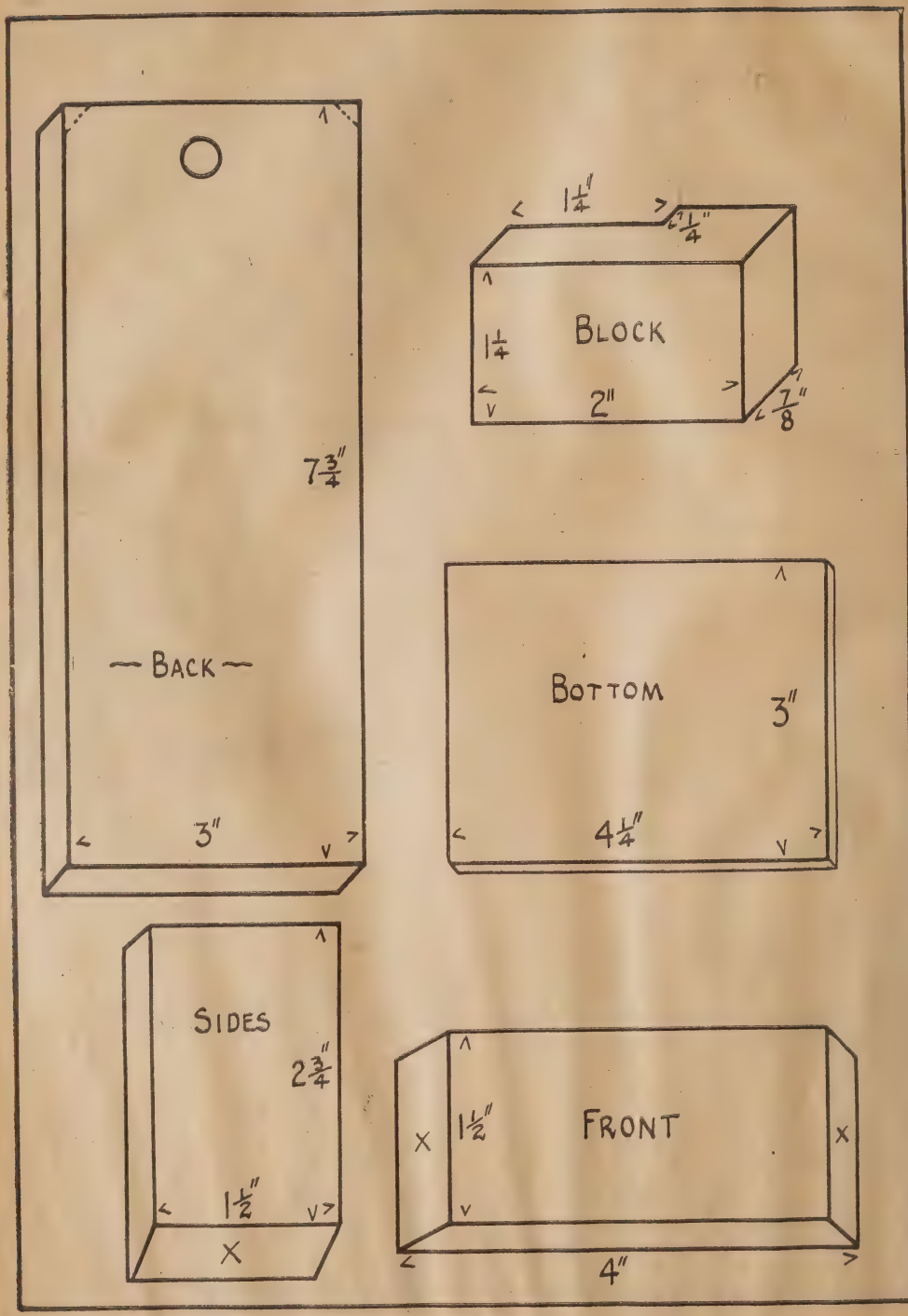
Actually there are three ways this may be done. FIRST: Give the egg a vigorous downward shake, breaking the yolk inside the shell. With a little balancing, the egg will now stand upright. SECOND: Without breaking the yolk, place a pinch of salt on the table and balance the egg on this. The salt acts like a magnet and draws the yolk down to the bottom of the shell, the egg is then easily balanced. THIRD: Without previous preparation, give the egg a light bump as you put it down, breaking the shell ever so slightly. This forms a base on which it will balance with a little patience.

THE MAGNETIC KNIFE

At the dinner table, banquet or party, one is often called on to do an impromptu trick. Although "impromptu" it is always advisable to have a few innocent (?) items in mind, and a little preparation beforehand is sometimes necessary.

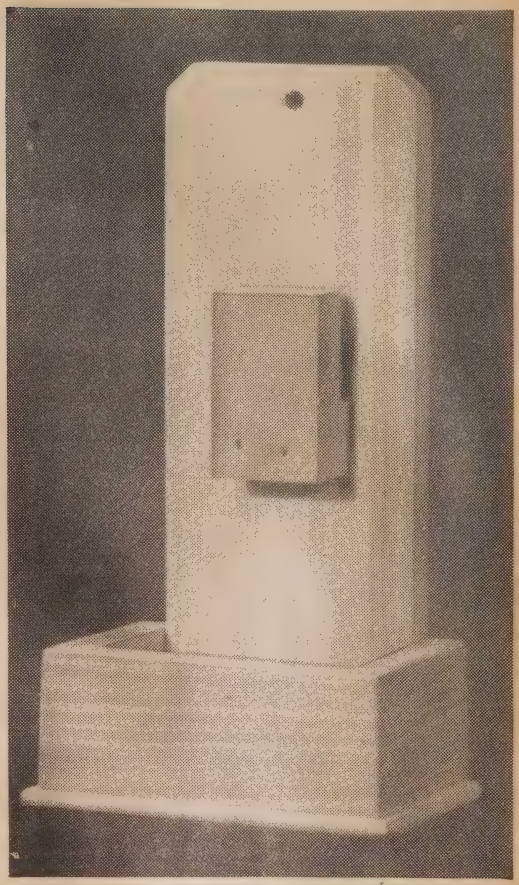
For this table trick, the performer picks up a table knife and rubs it briskly on the palm of the hand. Hey presto! It remains suspended from the finger tips, from the palm or the back of the hand in a very mysterious manner. (See left). Magnetised as it apparently is, only you can do it.

SECRET: Make up a small bottle of liquid from a very weak solution of seccotine and water and apply it to the hand or where you need it. It cannot be seen and will dry in a minute or so. It is sticky enough to cause the knife to stay in any desired position, yet it is not uncomfortable.


1¼"
1¼"
BLOCK
1¼
2"
⅞"
7¾"
— BACK —
3"
BOTTOM
3"
4¼"
SIDES
2¾"
1½"
X
1½"
FRONT
X
X
4"

Making a MATCH-BOX HOLDER

We commence with this issue, a new section, showing how even the youngest lad can make some handy and useful wooden articles. In later issues we will show you how to make a knife-box, a small table book-case, a pair of book-ends, and so on. We will also include notes on simple tools, and how to use them. The match-box holder described here makes an easy one for a start.



A photograph of the finished match-box holder. All the dimensions are given in the page of diagrams opposite.

HERE is a model which you can make very easily. It is a match-box holder—one of those things you hang up on the wall. It holds a box of matches and provides a little tray into which the dead sticks are placed.

The matchbox itself is partly opened, and is thus able to slip over the block, which keeps the "drawer" from shutting up.

You will find it a very handy thing to have in the kitchen near the gas stove, or in the bathroom near the gas-heater. It can be made from odds and ends, such as the lid of an old butter box.

THE WOOD

Almost anything at all will do for the wood. It may be anything from about one-quarter to one-half inch thick, for all but the block. The diagram gives the right size for this.

LAYING OUT

From the diagrams you will find the length of every side and end given. Noting them carefully, draw them out on your piece of wood, keeping the grain parallel with the longest side of each piece.

When you have cut them all out with your saw—nearly everyone has a saw which will do this job—you will have four pieces of thick wood, one block, which you can cut from something a bit thicker, and one piece, preferably thinner than the others, for the bottom.

We used a piece of 3-ply for the bottom, but almost anything will do.

BEVELLING

Now, the three pieces which make the little tray have their ends cut off at an angle of 45 degrees, so that they will fit closely round the angles. To cut these, you will do well to use a small plane—one of the iron planes obtainable for a few shillings would be a grand thing to have, and so handy in making these little wooden models.

Mark clearly with a pencil the piece to be cut off, and with a sharp knife make a clean deep cut along each pencil line. Now, when you plane off the bevel the wood won't chip off and spoil the clean edge of the wood. Plane along the edge itself. A sharp knife could also be used here.

In our diagram we have shown only one of the small ends, as they are both exactly the same. Note that the front has both its edges bevelled.

When you have them finished they should fit nicely. The final clean-up may be done on a piece of medium-grade sandpaper. And while you are about it, clean up all the pieces with this sandpaper.

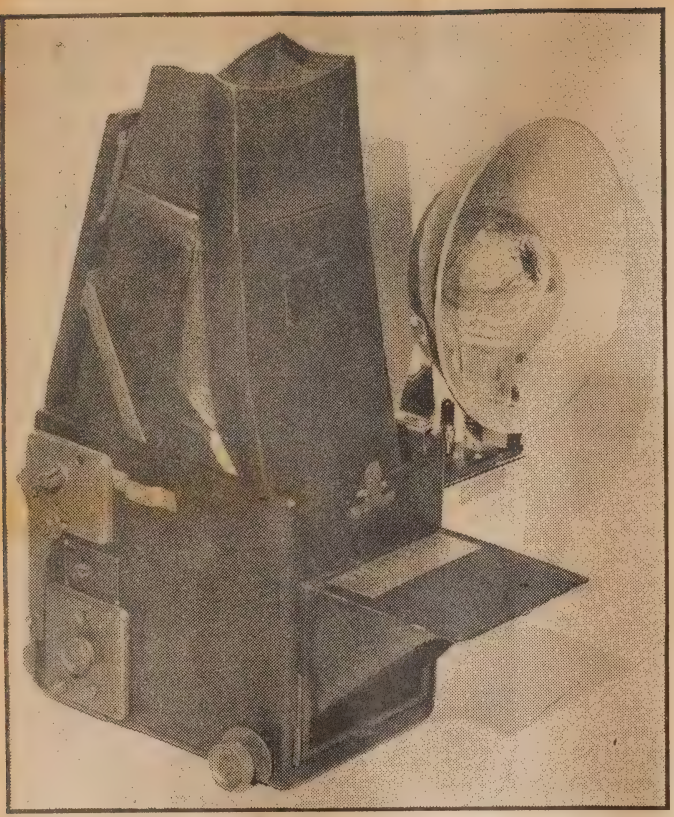
The block is very easily cut. If your cutting is a bit rough, you can easily smooth it down to exact size, using a strip of wood around which sandpaper has been folded. A knife once more can be used to cut out the "step" into which the box fits.

CAREFUL NAILING

You can smear the edges with a little glue before tapping in very fine nails to keep the job together, but this isn't essential. Go carefully, lest you split the wood while nailing. Don't put the nails too close to the ends of the wood.

A final clean-up with a fine sandpaper, and perhaps a coat of white lacquer, and your matchbox holder is complete.

THE REFLEX CAMERA



Here is a Reflex camera, of the Graflex type, as used by the cameramen of Associated Newspapers. This camera happens to be fitted with a special synchronized flashlight for instantaneous exposures. The winding key for the shutter is at the side, and the focussing hood will easily be recognised.

I'VE bought a reflex camera," announced Frank, who has given up golf and taken to photography.

"You talked me into it. Now talk me into how to use it, and why I bought the durn thing."

"Best kind of camera you could have bought," I told him. "First of all, their main advantage is that you can see what you're focusing as you focus it—that is, there is a ground-glass screen on which the image is reflected through the lens. Therefore, if your picture is out of focus you're either a nitwit or defective in eyesight.

"When you press the trigger the screen shoots up, sealing the camera against light entering through the ground-glass, and release the focal plane shutter—that is, a shutter which comprises two curtains which move across the face of the film or plate at varying speeds."

"Yes, but you said there were a 'lot of main attractions.' Please proceed along those lines."

"I'll tick them off for you. First, you can see the picture you are going to take. You see it the size it will be; therefore you can arrange it pictorially. Secondly, the focusing can be judged right up to the instant you make your exposure. This process is easy and exact."

"And what are its drawbacks? Nothing outside golf would be so perfect as all that."

"One thing only—its bulk. But here you can compromise. Quarter-plate reflex cameras are available, and are excellent to use. But there are smaller ones—say 3½ x 2½—which have all the qualities of a quarter-plate, and are also light and compact to handle. I hope you got one of these—there are a number of excellent brands on the market."

He nodded. "I did—by the grace of the feller who sold it to me."

"Very well. If you haven't already discovered the fact, you will notice that the back—that is, the container that holds the film-pack—can be revolved so as to take either vertical or horizontal pictures."

"I refuse to believe that there are no other drawbacks."

I thought for a moment. Then, "Only one, so far as I can recall. Reflexes are constructed essentially for use at waist level. There's a hood that sticks up out of the top of them into which you have to look in order to focus. Therefore, if a fence or some other waist-high obstruction happens to be in the way of your picture it is pretty difficult to take pictures over the top of it—unless you do some climbing.

"There is one other solution to that particular problem, however. The camera may be laid on its side on top of the fence and focused as it rests there. The only difference will be that the picture will be vertical instead of horizontal. Therefore, you will swing your rotating film-pack holder so that it *makes* the picture horizontal. In order to take a photo with the camera resting on its side like this, however, it is necessary for the release trigger and the focussing pinion to be on the one side—not one on each side, as it is with some cameras—I hope you made sure that your pinion and trigger are both on the one side when you bought your camera?"

"I did. And if this fence you're talking about is so high that you can't rest your camera on it—or so awkward that you can't? Maybe it's barbed wire."

"In that case you will hold the camera upside down above your head and focus it by looking up into the screen—and although this isn't easy, it can be done with some reflexes."

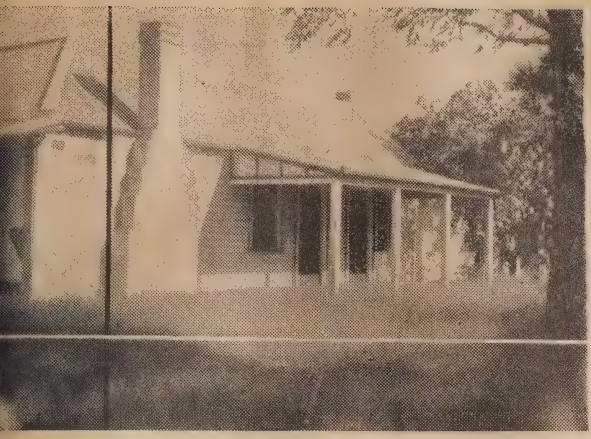
"Not *all* reflexes?"

I shook my head. "Not all reflexes; only those in which the mirror beneath the focusing screen is raised by hand and not by a spring."

"I'll go out and shoot a few subjects and citizens," he said. "There are a great number of citizens I'd like to shoot, now I come to think of it."

"Former golfing companions?" I suggested.

He shook his head. "Future photography companions . . . "



WHAT'S WRONG WITH THESE?

Each month, we will analyse one or two prints, which you may submit if you wish, suggest their short-comings, and how they might be improved. These are two typical examples which have been produced by everyone, one time or another.

EFT: This picture would be greatly improved by cutting as indicated. All at foreground is bulky and unnecessary. The verandah and wall on the ttreme left of the picture are untidy. Cut them out. For a better effect, o, it would be a good idea to print on, say, cream paper and diffuse uring the printing. In fact, the picture demands it. By doing these ings—simple in themselves—a dreamy, old-world effect would be obtained.

IGHT: This is a good picture spoiled—also, by lack of thought. It can be nproved somewhat by cutting out most of the foreground. And why was it necessary to have a clothes-prop in the picture, and a line full of washing? All those things must be watched. I feel that the photographer, by taking his picture from the small, clear hill to the right of the photo, could have got a much better effect. And this is a native village; so why are there no natives gossiping, or going about their daily tasks? Photography needs preliminary thought—a great deal of it.

The ART

An excellent example of filter work. A Red filter has transformed an ordinary pastoral shot into the highly dramatic photograph of high contrasts. Note the almost black sky, and the high relief cloud effect.

WHAT do you, as an amateur cinematographer, know about color filters?

Are you one of those people who, when the subject is mentioned, turn it off with, "Oh, all that technical stuff is miles above my head," or "I'm not nearly advanced enough to worry about color filters--I'm only an amateur at the game"?

Perhaps so. But, newcomer or seasoned camera-man, there is one thing all sub-standard workers have in common. That is the desire to make pictures approximating as nearly as possible the professional screen results. And a professional cameraman counts color filters among the most important part of his equipment. With the result that the professional screen often reflects shots which make the amateurs sigh with envy as they gaze forlornly at their own pallid efforts.

FILTERS INEXPENSIVE

Yet a color filter, which makes so much difference to the shot, costs less than ten shillings, is adjusted in a few moments, and is simplicity itself to use.

Every cinema-goer must have seen those superb outdoor shots of mounting white clouds against a dark sky, or the crisp, brilliantly white sails of yachts against a dun-colored sea. Then those exquisite "moonlight" effects, when two people stand silhouetted against shimmering water or the pale ghosts of tree trunks. But let the reckless amateur try to emulate these shots, and the result is, in many cases, just so many feet of film wasted.

The reason? A color filter!

Now, the beginner may well ask, "Why does a color filter make such a difference? Why does it darken the sky to throw the mounting clouds into high relief? Why does it add that snap and sparkle to the ordinary monochrome shot?"

Now here we must get a little technical. Not much, so don't be afraid of not being able to follow our explanation. But if you are going to get the best results from your color filters ,you must know something about the various light qualities and film sensitivity.

Every school child knows that white light is not white, but composed of different colors. This band of colors known as a spectrum, is made up of three components—red, green, and blue-violet light. The "in-between" colors are orange-yellow and blue-green. The human eye can readily perceive the green, blue, yellow, orange, and red rays—that is, the middle rays of the

OF USING COLOR FILTERS

NON-TECHNICAL DISCUSSION OF THE USE, MERITS AND RESULTS OF FILTERS.

By Frank Eastman

spectrum, for it is these that make you squint on bright, sunshiny days.

NVISIBLE LIGHT

But there are two groups of light the human eye can't see. First, the infra-red or heat rays, and, secondly, and more important, the ultra-violet rays. If we appear to be getting too technical, remember that the ultra-violet rays are he rays beyond the blue-violet end of he spectrum, and, consequently, invisible to the human eye. (See below).

But the ordinary panchromatic film hat you use in your cine camera is much more sensitive than the human ye. It can literally "see" colors invisible to you. And it is particularly ensitive to the ultra-violet rays, or the ays beyond the violet.

Now, let us put this explanation to a imple test.

Take your camera and go out into he open on a sunny bright day. It is scene that calls for your lens. In he blue of the sky masses of white olling cumulus clouds have gathered, hining and proud. You expose your lm and wait with impatience for its eturn from the processing station. magine your disappointment when you creen it. Those white clouds either ave vanished completely, so that you aze at a flat, grey expanse, or else, if ou are lucky, they show dimly against he sky as thin, anaemic outlines.

What has happened? The clouds ere undoubtedly there!

Of course, but you have forgotten the icks of the ultra-violet light and the xtreme sensitivity of your film. Your ye, because of its blindness to the ltra-violet light in the sky, saw those louds in vivid relief. But your film is ifferent. The ultra-violet light in the ky registered as rapidly as the white ght from the clouds. The result was he disappointing grey expanse.

What is needed is something between your film and the scene to produce positive separation between the clouds and the sky. The color filter is the answer.

It must be explained here that color filters do no impart any actual color to the film. They are called color filters because they make possible varying degrees of control over colors to which films are sensitive. And to avoid confusing you with numerous details, it can be stated that, for the average amateur, two filters will give an entirely satisfactory reproduction of color tones. They are the red and the yellow filters.

FILTERS ARE LIGHT TRAPS

Both these filters are light-traps, in that they prevent most of the ultra-violet rays from entering your lens and registering on the film. Your film becomes "blind" to the mischievous rays, so that the emulsion registers the scene almost as your eye sees it (if the human eye saw colors in black and white instead of polychrome). In other words, it brings up the ultra-violet rays short against the glass, but allows free transit to all other colors in the scene being photographed.

A yellow filter will cost you 8/6. It is about the size of a sixpenny-bit, and is provided with a split collar which slides easily over the lens of the camera. Once the filter is in position, the next point to watch is your exposure.

Lest this should puzzle you, remember that the filter removes the light-rays to which the film is most sensitive. Therefore, some compensation must be made, so that more of the untrapped light can enter the camera and the exposure be adjusted. Therefore, it is necessary that you "open up" your exposure—just how much depends on what type of day and the scene you are filming.

PRACTICAL EXAMPLE

Let us return, then, to our outdoor scene. It is a Saturday afternoon on Sydney Harbor, and the yachts are racing. Ordinarily, because of the intense amount of ultra-violet rays reflected from blue sky to blue sea, we would be foolish to attempt to film this without stopping down to f.11. But with a filter on our camera, those ultra-violet rays are useless. They cannot reach our film. Therefore, we must make compensation and allow more of the other light-rays to enter our lens. Very well! Open up—past f.8 and down to f.5.6. Now shoot! The result, with gleaming white sails on a dark sea against a grey sky will be well worth the experiment. You'll be completely sold, and register a mental vow of "no more black and white films for me without a filter."

So much for your yellow filter. Now let us deal with his brother, the red filter.

The red filter, which costs the same price and is affixed as easily as the other, comes into its own when you call for strong, dramatic contrasts in your filming. You may want your skies

(Continued on Next Page)

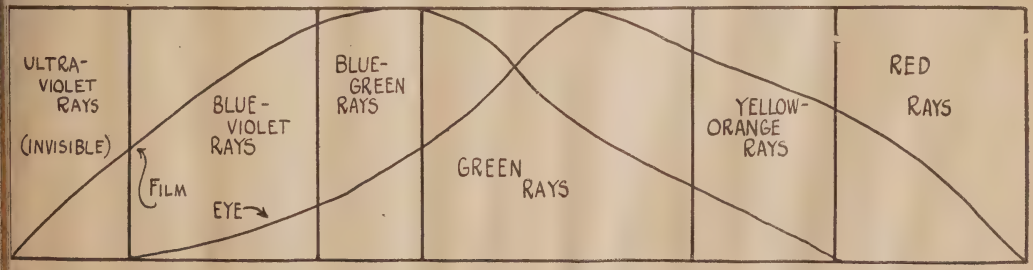


Diagram of the light spectrum. The visibility of the human eye is shown by the second line. The green portion of the spectrum is brightest to the eye, with relatively decreasing sensitivity on either side. The cine-film, on the other hand, is less sensitive to the orange, yellow, and red end of the spectrum, but more sensitive to the ultra-violet or invisible rays.

A.A.C.S. MEETING FOR MARCH

DETAILS OF GOLD CUP CONTEST

The Australian Amateur Cine Society's second meeting in March, at the Science Hall, Gloucester-street, was exclusively an 8 mm. night. Members' films were shown and the screenings were followed by an exhibition of the latest 8 mm. equipment.

Messrs. Reg. Perier and Robert Record commenced with a talk on "Keystone Products," then Mr. G. Stilling, for Herbert Small's, Messrs. Bottomley and Hill, of Kodak's, Mr. Harrison, of Cinecraft, and Mr. Harrington, of Kinelab, also spoke on behalf of their equipment.

Between each description of the various trade exhibits films were screened by Messrs. Hayes, R. Taylor, Arundle, Horan, and Watts. The last-named is a member of the Auckland 8 mm. Cine Society.

GOLD CUP COMPETITIONS

The A.A.C.S. Gold Cup competition is open to all amateur filmers or amateur clubs in Australia for the best film, any subject, exposed in Australia on 16, 9.5, or 8 mm. film. The competition closes on June 30.

The grand prize is a gold cup, presented by Mr. James A. Sherlock (vice-president of the A.A.C.S.), in addition to £10 worth of photographic goods. The grand prize will be selected from the best four films left in for final judging, and each will be awarded £5 in photographic goods. The conditions are that contestants must not be connected with any trade house and that original films only must be submitted.

Contestants may enter more than one film if they so desire. There is no entrance fee. The competition closes at midnight on June 30, when all films must be in the hands of the secretary of the A.A.C.S., Sydney.

* * *

REPERTORY FILM PLAYERS

A progressive amateur organisation is the Australian Repertory Film Players, who have a studio in Bulletin-place, Sydney. They are a most ambitious group, and among the films now being shot or at the cutting stage are "His Majesty the Bullet," "A Matter of Color," and "Old Loves." The Australian Repertory Film Players record sound both on film and disc, and intend to branch out into musical films shortly. Within twelve months they hope to turn out professional films on 35 mm. stock.

* * *

PHOTOGRAPHIC CRUISE

Additional information is to hand regarding the P. and O. Company's special photographers' cruise to Port Moresby on the Strathaird. The trip, which is arranged for June, will go via the Barrier Reef, and Mr. H. Mallard and representatives of Harrington's Pty., Ltd., will also travel for the purpose of giving every assistance to photographers. A wealth of material is at the disposal of those who are camera-minded, regardless of the medium in which they choose to work.

At Port Moresby several tribes will take part in native dances, and outrigger canoe racing has also been arranged.

The Strathaird will leave Sydney on the special photographers' cruise on June 23. Fares are: First saloon 20 guineas and tourist class from 13 guineas.

* * *

16mm MEETING

The next meeting of the A.A.C.S. will be held in Science House on April 17 at 8 p.m. It is a 16 mm. evening, and a selection of color and other films from the library of Mr. H. G. Spry will be screened. Mr. G. S. Stilling will give a demonstration of the Agfa Movector super six projector, and the evening will conclude with other screenings of members' films.

Interesting items pertaining to amateur film clubs and their activities are sought for this column. Address your notes to Frank Eastman, c/o "Wireless Weekly."

USING A COLOR FILTER

(Continued from Previous Page)

dark, very dark, black almost. You may want your whites glittering, shimmering by contrast. Very well! The red filter will do the job excellently for you. But this filter is even more firm with the ultra-violet rays than his yellow brother.

Where some may slip through the yellow filter, the red one says No, and means it. Therefore, compensation in exposure must be greater than for the yellow filter. If you are shooting at f.11 without a filter, or f.5.6 with the yellow, the red may require you to stop down to f.3.5.

THE RED FILTER

Even if you imagine strong dramatic effects are a little ambitious for you (although there's no reason why you should!), a red filter must certainly be among your equipment when it comes to filming wide scenic views. For example, take the view from Sublime Point, at Bulli Pass. It calls for your camera, but after the first two miles the demon haze will have settled down over the scene and present you with dim outlines that are disappointingly vague.

Blame it on to those mischievous ultra-violet rays again. The blue light from the sky strikes the earth and is reflected back again, and as it mixes with other light-rays causes the haze. And your camera lens, as explained, sees more of the ultra-violet than we do, and simply cannot penetrate. But a red filter slipped over the lens clears the haze like magic.

Color filters, to sum up, can be used to decided advantage for almost every outdoor black and white shot except close-ups of friends. Here they should be avoided, because, if used, they will render fast-registering flesh in a chalky white. Always use a filter when making distant shots with a telephoto lens—reason, to cut the haze. You should always use a filter for beach scenes, sunsets, aeroplane shots—either of or from—landscapes, and mountain shots. Certainly use one for any distant shots when there is snow on the ground, because, for one thing, there is generally considerable haze during the winter For another, snow and sky will appear similarly flat and white unless a filter is used to snap out the contrast between them.

Now, let us presume that after having used your filters a few times and benefiting by their aid, you want to try out something a little more ambitious. You want to end a scenic film, perhaps, as you've seen the professional screen do it—two figures in profile on a mountain top, blackly silhouetted against the darkening sky. Or perhaps you might like to try a moonlight effect, with dark tree trunks standing out against black water shimmering with moonlight.

It is far easier than it appears to get these effects. You don't need ultra-fast film or expensive lenses. You don't need even to wait for a full moon. A bright sunny afternoon and your red filter will fake the trick so successfully that few will guess.

MOONLIGHT EFFECTS

Here's the secret. In ordinary usage you would, as explained, open up two or more stops to compensate for the light-trapping qualities of the red filter. When you do, you get superlatively fine reproduction of sunlit landscapes. But when you **do not**, when you shoot as you would **without a filter**, the effect you get is of moonlight. The sky is quite black. Trees and foliage stand out in deep shadow against clouds touched with silvery light. The sunlight shimmers on dead black water. Houses appear the ghostly white of a bright moonlight night. And all you need for this effect is to shoot as you would without a filter. The reason being that the ultra-violet rays are cut off almost completely.

This concludes our lecture on the use of color filters. As we explained in the beginning, there is no special magic needed to accomplish the lovely effects you see in some films. It all boils down to knowing the tricks. And with a little care and commonsense the amateur shooting his first foot of film can achieve the same results as the semi-professional.

SCREEN DROPPING RESISTORS

When a sharp cut-off pentode is used as a resistance coupled amplifier a screen dropping resistor may be used very effectively to supply the optimum screen voltage and at the same time to give screen de-coupling and filtering.

THIS method, however, is not satisfactory in general with valves having super-control characteristics. It has been found that the screen current of a super-control valve is more variable than the screen current of a sharp cut-off valve, the result being due largely to a focusing effect between the control grid and the screen grid.

Due to this focusing effect an electron stream emerging from between the more open spacings on portion of the control grid may just strike or may just fail to strike one of the turns on the screen grid. Under certain conditions, therefore, it is possible to have a quite fortuitous change of screen current which cannot be controlled.

In addition to the foregoing effect there is also the effect that, due to the curvature of the characteristics, the optimum operating point, particularly with resistance coupling, is more critical than with sharp cut-off valves.

NOT RECOMMENDED

Due therefore to the combination of a more variable screen current and a more critical operating position, the use of a high resistance dropping resistor from the plate supply voltage is not recommended for general use. It may be used, if so desired, provided that individual adjustments are made with each valve in order to obtain the correct operating point.

With radio receiver production this would not be practicable, and the use of a dropping resistor is therefore undesirable. For valves of the super control class, such as the 6U7-G or 6G8-G it is suggested that the screen voltage be obtained from some form of voltage divider and not from a dropping resistor. When it is desired to have some form of A.V.C. it may be desirable to extend the point of cut-off by using a screen voltage divider having poor regulation.

This will give a result intermediate between a fixed screen supply voltage and one obtained through a dropping resistor from the plate supply voltage. For the 6G8-G a voltage divider having values of 1 megohm from the plate supply voltage to screen and 0.25 megohm from screen to earth has been found a very satisfactory compromise for use with audio A.V.C.

When there is no D.C. resistance in the plate circuit and when the valve is used purely as an R.F. or I.F. amplifier, a suitable value of screen dropping resistance may be employed, since in this case the operation is no longer critical. With reflex amplifiers or with resistance coupled audio amplifiers the dropping resistor is, however, undesirable.

—Radiotronics.

YOUR PRIVATE TELEPHONE

(Continued from Page 51)

speaking. These bring the microphone and battery in circuit, and short the key so as to bring the phones into connection with the twin line. The oscillator "B" battery then functions as microphone battery. While listening at the "home" station switch (S2) is "off" to prevent the battery from discharging through the microphone.

No doubt it will be quite possible to improve on the system as constituted at present by installing multiple switches instead of the wall type light switches used in the original. However, they happened to be available in the "junk" box, and were used on that account. Also, some arrangement could be made to enable more than one "distant" station to operate in conjunction with the "home" station.

This outfit can be used with equal effectiveness for communication between rooms, and would be ideal for Boy Scouts and Air League cadets who are interested in signalling. A permanent "set-up" would be very desirable for Boy Scout halls, or, alternatively, the turn wire could be fixed permanently round the wall from one room to another to terminate at two terminals mounted on a bakelite strip and screwed to the wall. The two stations could then be constructed as portable units.

The secret of learning Morse is to have regular practice sessions of short duration. Do not spend more than fifteen minutes at the one operation, but alternate sending with receiving. The sending session need not be as long as reception, but the main aim is to avoid monotony, which is the surest way to kill interest and hinder progress.

Good luck with it chaps, and I hope you have as much fun with this little outfit as I did.

COMPLETING YOUR TRANSMITTER

(Continued from Page 43)

Now the transmitter is turned on, having first of all been adjusted to give the right load for the modulator. (If you are not using the full input, work out the load from the voltage and current, and use a ratio to suit).

If you have a pea-lamp in the aerial circuit, watch it as you speak into the microphone, while slowly turning on the gain.

When fully modulating, there will be a distinct increase in brilliance as you speak. You can probably make this increase very marked indeed. If you do, you are probably over-modulating your signal and causing trouble. It is surprising how little rise in lamp brilliance occurs when modulation 100 per cent. on voice peaks.

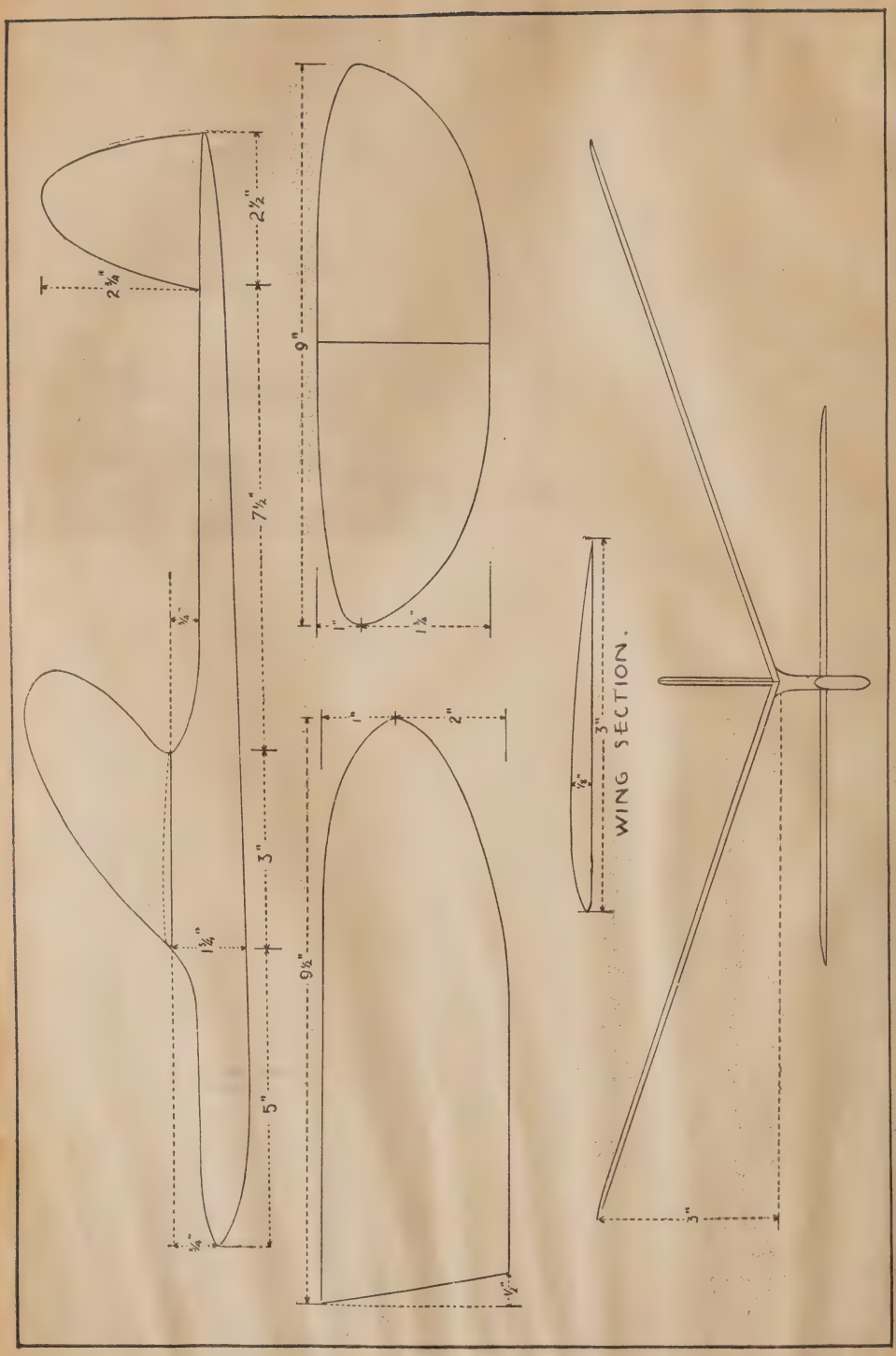
ADJUSTMENTS

Adjusting a modulated stage is such a job that it would be impossible to describe it fuly here. But watch for these:—

A downward movement of the plate needle, more than about 5 mills, on full modulation, means as a rule that the aerial is too closely coupled—a very common fault—or that the drive is not enough. If you expect first-class results, you must have about 35 mills of grid current through that 5000 ohms resistor, and no more than 83 mills at 600 volts. If you have the transmitter adjusted this way, there should be no reason why you should not get correct operation, with the right modulation transformer matching.

A golden rule is, if you cannot get a "rise" in aerial current on modulation, to reduce the aerial coupling. Even if you don't think so, ease it off. It may have been hiding up some other faults in your transmitter which you haven't been able to find.

Don't run the transmitter with extreme modulation unless you have some method of checking its depth. You are sure to get trouble if you do. The best check is a simple 913 oscillograph—worth its weight in gold for this work. We always keep one on the job with every transmission, "just in case."



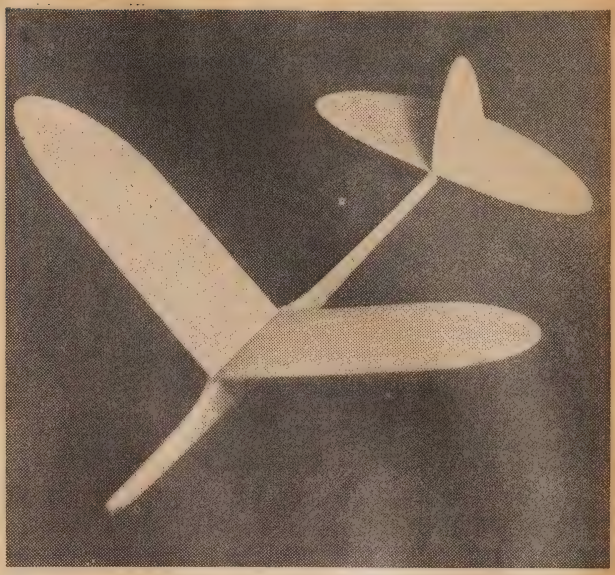
This diagram shows all the measurements you will need to build up the model for yourself. At the top is a side elevation drawn to scale, showing full details of the fuselage shape. Below it are outlines of the wings, and the tail. Each wing has the same shape—just reverse the outline for the second of the pair. The shape of the main wing section is shown next, tapering to a knife-edge at the tip. The outline at the bottom shows the model looking at it head-on.

The R&H SPECIAL

EIGHTEEN-INCH MODEL GLIDER

This fine little glider was specially designed for "RADIO AND HOBBIES" and is guaranteed to give first class results when built carefully to specifications.

By JOHN CAVILL



This photograph was taken looking down on the original glider, and gives an excellent idea of how it will look when completed.

☆

AS was mentioned in the last issue, this glider is based on the design which holds the present Australian hand-launched record.

The original record-holder had two faults. In the first place, it was a low ceiling model. No matter how hard it was thrown, 40 feet was the maximum height it would climb. However, its soaring qualities usually made up for this lack of initial height. A more serious fault was its tendency to spin at any time. On one occasion, it spun in from about 150 feet after it had been soaring over 1½ minutes.

In order to overcome these deficiences, the design has been modified in three ways. The length of the nose is now 5 inches to increase the maximum height. The sweepback on the wing is reduced and the dihedral increased, to overcome the spinning tendency. All of these make the model easier to handle, and a more consistent performer.

In its trials so far, it has justified these alterations. It responds readily to either rudder control or wing warping. On the morning on which it was tested, it could be thrown to 50 feet in still air, after which it glided in a flat, even circle, with 100 per cent. stability. In a strong breeze, 80 feet should be possible with this glider, and under favorabe atmospheric conditions, the model soars well enough to record many minutes.

Now that we know what the model will do, let's get to work. First the wood has to be chosen.

In choosing the wood, bear in mind that the model should weigh no more than 1 oz. The lighter it is the more chance it has of riding a "thermal." If you can get the weight down to ¾ oz. so much the better, but make sure you don't sacrifice strength.

THE CONSTRUCTION

Let's commence with the fuselage. Choose a piece of Balsa that is light, and which has an even grain. The wood should not be too soft, but the 3-8in. thickness allows it to be fairly light. Choose pure white balsa if possible. Squeeze it with your fingers, and if you can just make a mark it's about right. Draw the side view of the fuselage on the wood and cut it out with a fine fret saw. Then sand the edges round and taper the thickness of the fuselage to 3-16 at the tail, and to ¼ at the nose, leaving it the full 3-8 below the wing position. Cut a V shaped slot at the wing position to allow for the dihedral angle of the wing.

TAIL

Having completed the fuselage we turn our attention to the tail. This is cut from 1-16 balsa which should be very carefully chosen. Incidentally choosing wood is just about the most important part of building a glider. If this is your first model, and you don't know much about Balsa wood, tell your model dealer just what you want the wood for, and ask him to select it for you.

THE PARTS

1 piece Balsa, 18 x 1½ x 3-8—fuselage.
1 piece Balsa, 20 x 3 x 1-8—wing.
1 piece Balsa, 12 x 3 x 1-16—tail group. Acetone, cement, dope, sandpaper, etc. for finishing.

For the tail you require pliable wood, preferably with a stringy grain. Test the wood and see that it bends easily without cracking—brittle wood is useless.

Draw the tail and fin areas full size on thin cardboard. Cut them out, and from this pattern or template, make your balsa tail and fin. Sand them smooth and then cement the fin upright. If two strips of 1-8 square Balsa are glued along the joint you will have a much stronger job.

The tail is then cemented to the fuselage and held in position with pins. When you are quite sure the fin is perfectly upright and the tail sits squarely on the fuselage it is time to proceed with the wing construction.

THE WING

The wing is made in a similar manner to the tail, in that a cardboard template should be made, and the two halves of the wing cut from it. It is only necessary to make a template of one half of the wing, as both halves are identical.

When the two halves are cut out, fit them together at the centre, just as they will be finally assembled (with the sweepback the wings will roughly resemble a boomerang), and mark the top leading edge. This will prevent your later sanding two left hand or right hand wings—don't laugh at this, it has been done many times, and by modellers who should know better.

The job of sanding the correct wing section is fairly arduous and should be done carefully. If you like you can use a knife to commence the work, but do not go too far with the knife. Beginning with a coarse grade sand paper, work down and finish with a fine grade that polishes the wood.

(Continued on Next Page)

R. And H. Special

(Continued from Previous Page)

Next cement the wing at the centre. Lay one half flat and raise the other tip six inches—this will ensure correct dihedral. When the wing joint has dried it should be cemented to the fuselage and left to dry. Several successive coats of cement should be applied to the wing allowing time for each to dry thoroughly before the next is applied. The entire model, with the exception of the tail surfaces, should be given several coats of dope, clear lacquer, or balsa sealer. If you use lacquer, see that you don't add too much weight. The surfaces should be finally polished until a high lustre is obtained.

FLYING

To fly the model, give it a little left rudder (that is turn the rudder so that the model will circle to the left). Warping the wings will achieve the same result.

Then, holding the model in the right hand in a vertical bank, throw the model so that it circles upwards and outwards in a wide **right**-hand circle. The model should roll slightly at the top and commence to glide in a wide **left**-hand circle.

Persevere with this throw till you have it right. It's the style used by all the experts. If you're a left-hander, just reverse the adjustments.

You might prefer to glide your model straight for a start. If you are a beginner, you may get better results this way. In that case leave the model squarely lined up and launch it gently into the wind, preferably on the slope of a hill. This model should perform well under those conditions. However, don't waste much time on that style of launching—practise the side arm throw until you have it perfect, and maybe you'll be the next record holder.

The addition of weight to the nose may be necessary. Try screwing a brass screw into the nose.

THE WAKEFIELD CUP

AUSTRALIA'S CHANCES

In August this year the most important event in the model world will be flown at New York—The International Wakefield Contest

AUSTRALIA will be represented by a team of six, to be chosen this month. Their models will be sent to America to be flown by proxy Maybe some day model planes will find a rich uncle, and we'll be able to send our team overseas to bring back the trophy.

The only certainty for the team that we can see is Jim Fullarton, of Bondi. There are about a dozen others in the running, but Jim, who has represented twice before, is bound to be to the fore again this year. We believe he has a super ship with a folding prop, and a retractable undercarriage. In Australia we're proud of Jim, and maybe this year he'll bring the Wakefield trophy back for us. If he does, it will put Australia well on the map, and in 1940 we'll see the best model fliers in the world out here trying to take it away from us. There's no reason why Australia shouldn't win the trophy; we have the fliers, but, of course, the luck of the day counts, and then again it is hard to expect a proxy flier to get the best from a model. Even so, Bob Copland, the Englishman who flew Jim Fullarton's model last year, sent it out of sight after 11 minutes, and such a flight ought to satisfy anyone. Last year Jim was the only representative; this year, with a full team of six, our chances should be ever so much better. Anyway, here's hoping.

Next issue we'll be able to announce the full personnel of the team.

★ WHAT'S YOUR PROBLEM?

In this section we'll endeavor to solve your model problems. If any building problem troubles you, or if your super plane turns cold, write to us and we'll try and help you out. Incidentally, if you haven't any problems, we'd like to know what you think of our model plane section. Tell us what you'd like to see in it. Remember, we're getting it out for you and it's our job to see that you're satisfied.

Address your letters "Model Planes Editor," "Radio and Hobbies in Australia," 66 Elizabeth-street, Sydney.

J.S., of Petersham, has a model that goes into a perfectly flat spin when the motor cuts out and no matter how he adjusts it he cannot make it glide any other way.

We don't know how large the model is, but our guess is that it is not bigger than 24in. wing span. A bigger model would be unlikely to perform such a manoeuvre. The trouble is probably caused by the rubber knotting up in the tail. We have seen that happen before to small models, particularly if they have a parasol wing. Check your model next time it acts this way, J.S., and see if the rubber has knotted up in the tail. A shorter motor should cure the trouble. If this doesn't cure it, write again and send a three-view drawing, so that we can check your design.

The glider from beneath.

MODEL PLANE CLUBS IN SYDNEY

BONDI BLACK HAWKS
Sec.: Mr. T. Peters, 33 O'Donnell St., North Bondi.

CHATSWOOD.
Sec.: Mr. A. Goard, 2 Sutherland st., Chatswood.

CHESTER HILL.
Sec.: Mr. J. Weston, Prian St., Chester Hill.

GAS MODEL FLYING CLUB.
Sec.: Mr. J. Best, 15 Badmenton Rd., Enfield.

"HORNETS" SQUAD.
Sec.: Mr. J. Cavill, 18 Park Rd., Hunters Hill.

LEICHHARDT HAWKS
Sec.: Mr. R. Stevenson, 148 Norton St., Leichhardt.

MOSMAN MOTHS.
Sec.: Mr. H. J. Mackay, 89 Holt Ave., Cremorne.

WAVERLEY EAGLES.
Sec.: Mr. K. Edge, Grosvenor St., Woollahra.

PARRAMATTA.
Sec.: Mr. V. Jackson, 37 Wyeema Rd., Pendle Hill.

WESTERN SUBURBS.
Sec., Mr. C. Annesley, 31 Coventry St., Homebush.

HOW HEAVY IS HEAVYWEIGHT?

TWELVE OUNCE WAKEFIELD MODELS MAY BE STANDARD

IT seems that models become more and more complicated every day. First it was free-wheeling props., and lifting tails, and now we have folding props., monocoque fuselages, and retractable undercarriages, and did we hear someone say that next year we'll be building 12oz. Wakefield models? Well, 8oz. was bad enough and I think some of us long for the good old days when 1½oz. 2 F.C.'s flew out of sight and we thought 4oz. models were heavyweight.

Those were the days, or were they? After all, we've learnt a lot since then and while we keep finding new problems, we're not going to lose interest in the game.

Anyway, that 12oz. isn't by any means final or even official, it's just a premonition. But we do think it would be a good idea if you Wakefield enthusiasts started to think over at least a 10oz. design, just in case.

FINALITY ON RECORDS

There have always been doubts existing as to the authenticity of many so-called records. In the past, of course, this was due to the fact that we had two independent bodies governing the game in N.S.W.

Now that we have got together a Model Aeronautical Association, something can be done about the record question. In future records will only be recognised when they are established under competition rules at an authentic city flying meeting. This means, of course, that conditions will be equal for all.

There is nothing in these rules to prevent anyone setting up local records for their club. Headquarters have no intention of interfering with club management, but official association records can only be established at official association meetings. So now you know.

An imposing array of models made by the Chester Hill boys. This picture was taken at a recent meeting for inter-club contests.

CONTEST PROGRAMME

Get your models ready for these contests. They have been arranged by the council of the M.A.A. and will be flown on metropolitan flying grounds.

The exact dates of the N.S.W. Outdoor Championship, the N.S.W. Scale Championship and the John Elliot contest for the R. O. W. Wakefield models will be announced later.

Every metropolitan club will be eager to make a bid for the club shield this year. Last year saw the number of teams competing grow from three to six and this year there will probably be ten nominate. Each club enters a team of four. On the last Sunday of the month these teams compete with R.O.G. fuselage models weighing at least .03oz. per square inch of wing area. The team securing the best average on the day keeps the shield for one month. The shield finally goes to the club securing the most victories during the year.

BIG MEETINGS TO COME

May 14th: Gas model Precision Contest. Dumbleton. (Points for design, workmanship, take-off, initial climb, stability, glide, landing. Duration doesn't count).
May 28th: 1st Round 1939 Interclub Shield. (Flying field depends on draw).
June 11th: N.S.W. Indoor Championships. Wests Theatre, Darlinghurst.
June 25th: 2nd Round Interclub Contest and Open Duration Contest.
June 30th: 3rd Round Interclub Shield. Open Contest.
August 5th and 6th: Australian Championship Contests.
August ??: Annual Exhibition.
August 21st: 4th Round Interclub Contest.

APRIL CONTESTS

BONDI WINS INTERCLUB SHIELD

The final of the 1938-39 Interclub Shield was flown at Dumbleton on Sunday, April 2. Mainly due to Jim Fullarton's splendid time of 18min. 27 2-5 sec., Bondi won the trophy with an aggregate of 21min. 48 2-5sec. Jim's time incidentally constitutes an Australian record for R.O.G. weight-rule fuselage models.

In the open duration contest another splendid flight won. This time Jack Brown, of Chester Hill, sent a weight-rule "Korda" machine out of sight after 23min. 15sec. This also constitutes a record for H.L. weight-rule machines. In this contest the issue was in doubt for a long time. First to get going was John French, of Chatswood, whose machine set up 11min. 57 1-5sec. Then Les Butler, of Leichhardt, improved on this time with 15min. 30sec., and for a long time it seemed that Les would win. Finally Jack Brown set up his magnificent flight to carry off the contest.

The results of the day's flying was as follows:—

Interclub Shield Final.—Bondi Black Hawks, 21min. 48 2/5 sec., 1; Waverley Eagles, 6min. 2 4-5sec., 2; Parramatta, 5min. 40 1-5sec., 3.

Open Duration Contest.—J. Brown, Chester Hill, 1; L. Butler, Leichhardt, 2; J. French, Chatswood, 3.

Precision Contest.—K. Wright, Parramatta, 48sec., 1; M. Willman, Hurlstone Park, 48 2-5sec., 2; A. Goard, Chatswood, 47 1-5sec., 3.

Morse Code Practice Sets, with Switch Buzzer to Light. Use as you desire. 22/6 No. 1, complete.

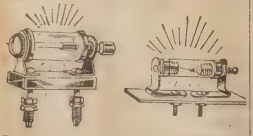
and Heavier Type Morse Key, 30/-. No. 2.

25/- 32/6

Gramophone-Radio Pick-ups. Fit and suit all types of sets. Play your Gramophone through your Radio. All models complete with Volume Control and Tone Arm. "Like-a-Flash" 22/6, Clarion 25/-, Cosmocord 25/-, Cosmocord de Luxe 32/6, Cosmocord High Definition 38/6, Cosmocord Super 45/-, B.T.H. Crystal 75/-, Amplion 28/6, Richards 25/-. Radio-Gramophone 240-Volt Electric Unit Gramophone and Pick-up, mounted on plate, 90/-. Send for List.

Play, Talk, Sing, Joke through your Radio, Great Fun. Batteryless type Microphone for Hand Holding or Hanging, 22/6. Complete with lead, fixed in a second. Others 12/6, 15/-, 17/6, 25/-, 28/6, 32/6. All plus 1/9 for Battery and 1/6 for 20ft. Cord. Write for detailed List.

B.G.E. Table Type Microphone. Highly recommended for Amateur or Professional use. Built-in Transformer and Battery with Volume Control incorporated. Just plug into pick-up terminals of any set. 39/6.



Crystal Detectors, as illustrated. A1 Semi Fixt Type Midget Glass Enclosed Type, 2/6. Continental Type, with plug-in pins and sockets, 3/9.

Microscopes, 6/9, 8/6, and 10/6. Sets 3/11, 12/6, 25/-. The World's Smallest Illuminated Back Panel Dial, 2½in. Escutcheon Plates, 7/6.

Like-a-Flash Cigarette Selling Machines, for Wall or Counter. All Metal, Fool Proof. Two sizes, holds 18 packets of 6d cigarettes, Price, 45/-. Larger size, holds 24 packets of 6d cigarettes, Price, 55/-. Special price in lots of 6 and 12. Traders, write for fullest details quantity lots.

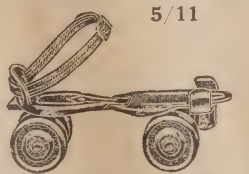
Extendable Periscopes. 3/6.

We stock all kinds of Torches. Inquiries welcomed. Fountain Pen Size Torch, 2/-, complete.

Electric Continental Soldering Iron, 15/-. 150 Watt Heavy Duty Type, 25/-. Goldstone British manufactured Electric Soldering Irons, 5/6, complete with Flux and 2-Pin Adapter.

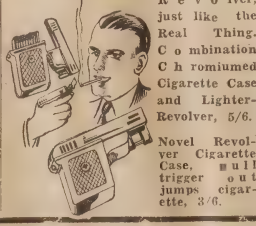
Special Prices to Wholesalers and Retailers.

Morse Code Keys, as illustrated. Adjustable all ways, 12/6. P.M.G. Type, 19/6. Buzzers, 2/6, 2/9, 3/6, 7/6.



5/11

Extension Ball Bearing Skates. Steel Wheels, 15/-. Boys' Street Skates, 5/11. Made in U.S.A.



Revolver, just like the Real Thing. Combination Chromiumed Cigarette Case and Lighter-Revolver, 5/6.

Novel Revolver Cigarette Case, pull trigger out jumps cigarette, 3/6.

Special Line of British made "Like-a-Flash" Gramophone Pick-up Heads. Fit and suit all Standard Tone Arms, 12/6. Now 8/6.

Osram 2-Volt Battery, Screen Grid, S215. Now 5/-. 227, 5/9.

"Like-a-Flash" Street Tone Buzzer, Bakelite Case, 3/9. Others, 2/6, 4/9 and 7/6. Write for full list of Morse Keys, Sounders and Buzzers.

Television and Short Wave Book, 5/6. Everybody's Wireless Book, 5/6. The Book of Practical Radio, 8/6. Practical Television, 8/6. A Splendid Publication, the Outline of Wireless, Cloth Bound, by Ralph Stranger, 10/9. The Radio Amateur's Call Magazine, 11/6.

8 mfd. Wet Electrolytic Condensers, leading makes, 2/9. 2 reading volt Meters, pocket type, 3/9. Emicol 4 in 1 All Purpose Radio Meter, 12/6. British.

Like-a-Flash "Eliminoise" Aerial Kit for short or dual-wave sets. Aerial, Pyrex type Insulators, transposition blocks and 200ft. aerial coil, 22/6. Eliminates unwanted aerial and hideous electrical noises from your dual-wave or short-wave set.

Just arrived from the maker in London. "Cosmocord" De Luxe Crystal Pick-up, with incorporated Vol. Control, 48/6. Guaranteed 84/- value. Now 48/6.

Electric 240 Volts Gramophone Motor. All Fittings, with Turntables, etc. British make, 39/6. Send for list of Electric Motors and Gramo.-Radio Units.

The All American All Station Crystal Set, with variable coil. All Parts 23/6, Assembled 33/6, in Cabinet 43/6. Phones from 10/6. Charts 6d; free with kit.

Osram English Brand New 235 Valves, 8/6. R.C.A. No. 1C6, 7/6. Brand new Radiotron 6A8, 6F5, 6K7, 9/6.

English Lightning Arrester Switch, 5/6. The Best made for in and outdoor use. Other Arresters, 6/3 and 1/6.

VALVES USED FOR TESTING BUT ALL GUARANTEED.

6 Volt Battery Types, A609, A615, and other types, likewise 4 Volt Battery Series, 6/6 each. 224, 235, 5/6 each. 42, 201A, 3/6. E415 types, 3/9; brand new, 5/9. 57, 58, 5/6. 75, 57, 56, 55, 49, 5/6. 32, 34, 5/6. 6B7, 6F7, 2A5, 6/6. 1C6, 1C4, 5/6. 6A6, 6D6, 5/6.

Microphone Buttons, Large or Small, 4/8, Post Free, with fullest directions for 1000 and 1 uses, for making your own Mike, increasing and reproducing the volume of string instrument, etc., etc.

VALVES, MADE IN U.S.A.

Type	List Price.	Our Price.	Type	List Price.	Our Price.
57	14/6	10/6	6H6	16/-	12/9
58	14/6	10/6	35	17/-	12/6
33	15/6	12/9	6D6	15/-	11/-
32	15/6	11/3	6C6	15/-	11/-
2A5	14/-	10/6	6A7	16/-	11/9
2B7	19/-	14/-	6B7	16/6	12/-
27	16/-	11/9	42	14/6	12/-
6E5	12/-	9/-	80	11/3	9/6
6K7MG	17/-	12/9	71A	16/-	11/9
5Y3	11/3	8/9	47	17/6	12/9
6J7	15/-	11/3	75	15/-	11/-
2A7	18/-	13/3	24A	15/6	11/3
280	13/6	9/6	30	14/6	11/-

AMERICAN MOTOR CAR AERIALS,
Made in U.S.A.
Door Hinge Fixing Model, collapsible, all fittings 23/-. Motor Car Electric Mudguard Fender Lights, 9/6. Coloured Illuminated Tops. Send for full particulars of other Car Aerials.

Model Electric Motors. Work off Wet or Dry Battery or Transformer, as illustrated, 4/9 Other Types, 8/6, 11/6, 15/-. Small Model Motors, 3/6. Kit of Parts to build Small Motors, 3/6. Small Outboard Boat Model Motors, 12/6, 19/6.

Write for full list of Radio Testing Meters. English All in 1 Meter. Reads everything in Radio, 18/6.

WATES' ORIGINAL POCKET METER—4 RANGE TYPE.
Reads— 0 to 6.
0 to 15.
0 to 180 Volts.
0 to 30 M/A. 14/-.

Totem — A Little Gamble for Home, Club, Bazaar, or Fete, 21/-. Push Lever, wheels spin for winners and odds. Write for Fullest List of Games.

"PRESTO" THE MAGIC BOX
The most Amazing Trick—Just out.

"PRESTO" — The greatest, most alluring and outstanding little Trick ever introduced, 2/9, Post Free. Money back if it's not the best yet. Agents wanted everywhere.

Giant size packet of Assorted Foreign Stamps, 500 for 2/6.

LEVENSON'S RADIO

Wholesale, Retail. Wholesale, Retail.
Games, Hobbies, Novelties, and Slot Machine Specialists,
226 PITT STREET, SYDNEY.

Everything from A to Z in Radio at Sane Profit Prices.
'Phones, M2525 and M2526-7. Goods forwarded C.O.D. Post or Rail (C.O.D. Rail within N.S.W. only, Not Interstate). We Welcome Prepaid Telegrams and Long Distance 'Phone Calls. Send 2d Stamp now for Special Interesting Bundle of Illustrated Literature. Wanted Agents to sell our lines.

HETEROGENEOUS WELDING

Here are some notes on a subject not often covered from this angle. If you are fond of unusual jobs, you may find them of very special value.

A. J. BARNES

There is "Alf" Barnes, himself. A keen and practical hobbyist, he has entertained Junior Technical readers in "Wireless Weekly" through many months, with his maxims and models. An "Amplifier Contest" finalist in 1934, and the "Barnes Mystery Circuit" originator, he has spent many years playing with radio. He also owns and operates VK2CE. Mr. Barnes will continue to be a regular contributor to our pages.

UNDER this rather formidable heading are classed the many methods of bonding under heat similar or dissimilar metals. It is not our intention to discuss fusion welding, whereby the parent metals are melted and run together, but, rather, the processes of "hard" and "soft" soldering.

We are all more or less familiar with the processes of "soft" or "tin-soldering," and we know that to many readers even a short review of soft-soldering, or, as we all know it, just plain "soldering," will be wearisome repetition. However, the newcomers will always be with us, so it is to them that we address the few remarks under this first sub-title.

SOFT SOLDERING

Soft soldering is the process whereby metallic objects are held together and heated to a temperature equal to that of the particular alloy of tin and lead which has been chosen as the bonding medium. Of course, these bare essentials require considerable elaboration before a successfully soldered or "sweated" joint can be made.

The first essential for soldering work is a source of heat, and by far the most common medium is the soldering "iron," or bit. This is made of copper, and varies considerably in size and appearance according to the type of work to be done. Reliable electrically-heated irons can be purchased at a reasonable price, and it is well worth-while spending the few extra shillings for their convenience and self heat-regulating properties. Of course, a source of electric current is not always available at the job, and it is then necessary to use the ordinary iron, which may be heated by gas and fires, etc.

Solder is a mixture of lead and tin, and appears in several different forms, such as rods and wire. Cored solder is also commonly used, the core being filled with a suitable flux.

Fluxes vary considerably in appearance, but all serve the essential purpose of destroying the film of oxide which forms on a metal when heated. If this oxide were present between the solder and the parent metal, it will readily be realised that a proper joint does not exist. In the same manner, a flux allows the molten solder to "run" readily.

The successful soldering of iron, steel, plumbing, and other work calls for a flux which will be rather violent in action. Such a flux consists of hydrochloric acid into which zinc has been dissolved. This corrosive flux is not suitable for delicate work which cannot be thoroughly washed after soldering. For work of this nature the radio man's friend, "resin-cored" solder, is invaluable.

HARD-TO-SOLDER METALS

Because of their oxide content or alloy make-up, there are a few metals and alloys which cannot be properly soldered, although it is admitted that in some cases special proprietary compounds may be applied with only fair assurances of success. Some of these hard-to-solder metals are aluminium, cast-iron, die-cast metal (of the bismuth group), and nickel alloys.

Early last year we wrote, for the benefit of young chaps interested in our "Wireless Weekly" junior technical pages, on the knack of soldering, and we make no excuses for quoting:—

"The main knack in soldering is to properly judge when your iron is at the correct heat. The tinning method given here provides good practice at this. With a flat file neatly trim the business end of your iron until the bright metal shows. In an empty tobacco tin place a piece of solder the size of a pea, together with the same amount of flux.

"An electric iron is plugged into a power socket, the current switched on, and left this way right through your job. The common soldering iron is heated over a gas ring or fire.

"If an open fire is used it is a good idea to first poke a piece of waterpipe in and then slide your iron into the pipe. This keeps the ashes away from the clean surface. After a minute or two rub the point of the iron into the mixture of solder and flux. Maybe the iron is not hot enough, so back it goes. Do this frequently, and soon you'll find that the solder melts when rubbed with the iron. When this occurs rub the solder and flux into a puddle (twisting the iron around) and you will notice that the business end now has a bright silvery color. In other words our iron is 'tinned.'

"Say we have an aerial wire to join. Scrape the two ends until the bright metal appears, then twist together. Smear the joint wtih flux and lay on a piece of wood. Heat your iron as before, give the tip a quick rub with a

(Continued on Next Page)

HETEROGENEOUS WELDING

(Continued from Previous Page)

clean rag, and hold firmly against the join. Now with your other hand press the end of the solder stick against the joint also, and watch what happens! First the flux melts, then the solder follows, running right into the crevices. Keep the joint quite still until the solder has set, otherwise it will be brittle and weak. Other soldering jobs are merely slight variations of this procedure."

HARD SOLDERING

Brazing and silver soldering are the two common forms of this method of bonding. The advantage of this process lies in a union that is very much stronger than soft soldering. There is also the fact that a brazed joint is practically unaffected by the destructive tendencies of heat and corrosion.

While the temperature required for a brazing job (dull to bright red heat) is considerably in excess of that for soft-soldering, it should be realised that the parent metals are not brought to the molten state, and there is thus less risk of destroying the mechanical properties of the objects being joined. This risk is very much apparent when the fusion welding process is used, but in due deference to modern welding technique, we mention that materials for a fusion equal in make-up to that of the parent metal, are rapidly nearing perfection. This is why proper welding calls for a high degree of skill.

Cycle framework is the most common application of joining by the brazing method, although there are numerous other applications.

The heating source for brazing work is usually derived from a burner or blowpipe fed by gases under pressure, such as coal gas and air, acetylene and oxygen, or petrol vapor and air. The heat is localised around the joint, and draughts kept away by piling old house-bricks, fire-bricks or coke around the back and sides. It is quite possible to braze joints up to cycle size, by means of the ordinary painter's blowlamp.

As the name suggests, brass wire or strip is used for the joining medium where such metals as steel, iron, or metals whose melting points are above that of brass, are concerned. Naturally, if an attempt is made to braze metals of a lower melting point, there will be an imminent risk of the whole structure collapsing. Such jobs usually consist of brass or other copper alloys. These should be joined by the process known as "silver soldering."

SILVER SOLDERING

The technique for silver-soldering is similar to that of brazing, but in this case less heat is required, and the solder or filler material consists of a mixture of silver and brass. Common applications of silver-soldering will be found in jewellery and other such work.

In all brazing jobs a flux consisting of borax or boracic acid powder or paste may be used. Borax is preferable when the temperature of working must be kept as low as possible, although the borax when cool remains as an extremely hard glass-like substance which is difficult to remove.

"PHOS-COPPER"

This necessarily brief treatise on heterogeneous welding would not be complete without some mention of this remarkable material.

As the name implies, phos-copper is a mixture of phosphorus and copper, and was developed by the Westinghouse Company as a material for bonding such electrical gear as is made from copper or bronze. Phos-copper runs through a joint even before the parent metals have reached red heat, the resultant join when cool is all that could be desired. This process is particularly suitable for the joining of copper rotor bars to the short-circuiting ring on the rotors of A.C. motors.

ANSWERS TO CORRESPONDENTS

Beginner (no address) sends a circuit a simple receiver.

A.—Many thanks for the circuit. We pe to do some experiments with cir- its of this kind in the near future. atch later issues for details of results.

R.J.G. (Lismore, Vic.) sends a one- ve circuit.

A.—Sorry, but this circuit was feat- ed by us many years afo as the "Ex- ordinary One" and as the "Country- n's One" and got us into no end of uble with the radio inspectors, as it radiates and causes interference with er sets in the neighborhood. It was finitely "outlawed"; a pity, as it is y effective.

C.C. (Black Rock, S.A.) writes and ntions that he has had great success th the "Cricket Special" circuit origin- y published in our issue of October 1932. He builds them up for sale console cabinets, and has turned out r 30 to date, and all are giving good ults with keen economy.

A.—Glad to get your letter and the ggestions. We would like to see a sample one of the articles you suggest. So we have found few who combine nowledge of journalism with the right d of ideas, and we hesitate to make y promises until we see the actual le of writing.

J.M. (Northwood) sends in a sub- iption and inquires for articles deal- with U.H.F. receivers.

A.—Yes, we have plans to run articles this kind later. Mr. Moyle has done ot of research work on 5 metres and a recognised authority on the subject.

H.D.A. (Surry Hills, Vic.) wants cir- ts for short-wave crystal sets.

A.—It is possible to receive short-wave nals on crystal sets, but hardly in a nner which you could consider seri- sly. On the other hand, it is quite a nd scheme to build up a one-valve ort-wave set on the lines of the "Little n's Mate" circuit, and with such a you could get real results. We ongly advise you to save up and ild a set of that kind rather than ste time and money trying to get ort-wave results with crystal sets.

J.M. (Richmond) offers an article on ew type of microphone.

A.—Sounds like a good subject for an icle, but we can't guarantee to accept until we read through it. As you ention, your punctuation is not the st, and there might be trouble in this rection. No harm in trying, if you are en enough. We greatly appreciate ur kind words.

W.C. (Newtown) is pleased with the st issue, but wants to know when expect articles on test equipment.

A.—The subject will be fully covered due course. As you will notice in s issue we have started on meters.

L.G.Q. (Blackwood, S.A.) sends in eral suggestions for future articles.

A.—Thanks very much for the letter, d the many helpful suggestions. There not the slightest doubt about the sub- ts being interesting, and we have nty of scope to work for many nths to come.

WHAT SOME OF OUR READERS HAVE SAID!

C. Carter, Black Rock, South Australia: "If you can keep Radio and Hobbies up to its present size and standard the success of this magazine should be assured."

John Miller, 34 Cliff-road, Northwood: "It is the goods."

Harry D. Allen, 98 Croydon-road, Surrey Hills, Vic.: "I am very pleased with this instructive paper."

Edgar Hards, "Woodlands," Barmedman: "I liked it so well that I sent down a year's subscription right away."

W. Causer, 111 Station-street, Newtown: "I shall feel it almost a crime to miss any issue."

Mrs. V. L. Gooma, 347 Ipswich-road, Annerley, Q.: "It is a very useful book to me."

D. McKinnon, 87A Premier-street, Marrickville: "The layout is very good, and the book provides interesting reading from cover to cover."

F. H. Hinde, 804 Macleay Regis, Potts Point: "Congratulations on the new paper. It's a marvel."

S. G. Lewin, Seven Hills: "I am writing to congratulate you in filling a long-felt want in this direction."

P. Shields, Desborough, Esplanade, Manly: "I think it is very fine."

Neville Wall, Lower Nambucca: "I think it is a very valuable paper to anyone who has a hobby."

Allan W. Davis, Nulla Nulla: "I think it is the most up-to-date journal in Australia at the present time."

Thomas Black, 35 Marion-street, Leichhardt: "I am delighted with the wealth of information contained in the Radio and Hobbies, but I wish that it was published every week."

T. Preston, 18 Digger's-avenue, Gladesville: "I feel sure that every reader is satisfied with the good work you are doing."

Kenneth Allen, 89 Mi Mi-street, Oatley: "It is a worthy publication, having great nutritive qualities to those to whom you dedicate it."

Fred C. A. Pile, Macksville: "I congratulate you on such an excellent publication."

E. F. Downey, 46 Russell-street Oatley: "I am sure it will fill a long-felt want, and it is certain to receive the support it deserves."

Frank J. Ryan, East Lynne: "You deserve praise for your efforts."

T. A. Walker, "Lagoons," Dulacca: "Enclosed is my subscription to Radio and Hobbies, which I consider is an exceedingly low rate to pay for such a monthly. Please allow me to congratulate you on turning out an excellent job."

F. S. Turner, 51 Juliet-street, Mackay, Q.: "I think it is an excellent magazine for all radio-minded people."

R.H. (Camberwell) sends in a suggestion for a small circuit.

A.—We suspect that you have redrawn this circuit from an American magazine. It appears to be only suitable to use from 110-volt power supply mains, and to attempt to operate it from 240 volts would be disastrous. There is no easy way of rearranging the circuit to make it suitable for local conditions, and even if it could be done we would hesitate to recommend a set in which headphones are more or less directly connected to the power mains. The idea to form a short-wave league seems very good, and doubtless we will go ahead with something of the kind as soon as we get settled down.

V.J. (North Sydney) points out two apparent errors in the "Skyhound" parts list.

A.—Yes, the resistor listed as 300 ohms is shown as 350 in the circuit, and the one listed at 200 is shown as 210. Actually the circuit values are correct, but there should be no difference in results with either values. Those shown in the parts list are more likely to be readily obtainable at all dealers. Quite an amount of tolerance is possible in all bias circuits as there is a compensating effect. The "Skyhound" could be considered as the "Inversed Six."

V.H. (Pomona) has a set which apparently operates quite well at night, but only makes a rushing sound when tuned to certain stations in daylight.

A.—This is more or less normal, and simply indicates that the stations you mention are not putting through a strong signal to your locality in daylight. If you check up with neighbors you will find that they have similar difficulty in regard to daylight reception. The makers of your set went into liquidation some time ago, and although we heard a rumor that they were going to be re-formed, we have not heard whether this was done. We can't give you any address to which you could write for information.

E.B.L.H. (Barmedman) asks if inverse feed back can be used with the "Economy Six."

A.—No, inverse feedback is not effective with a comparatively low impedance first audio valve. The magnetic speaker could be fitted in parallel as suggested, and although it would affect tone and power slightly, it should work. The set is not suitable for gramophone pick-up work as described.

E.A.B. (Mulgeldie) inquires about a blue glow in his output valve.

A.—There are two entirely different types of color sometimes found in valves. There is a purple haze which appears on the inside of the glass of some pentodes, beam power valves, and others which merely indicates a high internal vacuum, and does not indicate trouble. But an entirely different type of red and blue glow around the actual plate or other internal elements often denotes a gassy internal condition, indicative of impending trouble.

(Continued on Next Page)

ANSWERS TO CORRESPONDENTS

(Continued from Previous Page)

R. R. Rashleigh, of Snowtown, South Australia, writes in reply to "B.B." of Camuria, and others, that he has had a lot of experience in re-winding generators for wind chargers to make them suitable for operation in light winds without gearing. He claims to have had great success with such windchargers, his own job lighting 11 lamps and running for four years without any attention. Those interested can get in touch with Mr. Rashleigh direct at the above address.

R.C.C. (Point Clare) mentions that he has complete volumes of "Wireless Weekly" from 1924 to 1939, which he does not want.

A.—You do not mention whether you want to sell these issues or whether you are prepared to give them away to anyone interested. If you are giving them away we will be pleased to insert a notice to that effect in these columns, giving your full name and address, but if you have in mind to deal with them we would refer you to our advertising department. We await further advice.

G.G.M. (Gympie) sends for a private reply.

A.—We regret that we do not have the organisation in hand to answer queries individually. When the answers are posted, only one reader gets any benefit from the effort, but when they are published thousands of readers find them interesting. The old Gilfillan set should be pensioned, having done good service, and being a very poor proposition to keep in operation on account of its heavy power consumption and limited power output and tonal quality. You are sure to have difficulty in getting details about the set, as there has been a practical embargo on imported sets for the past ten years.

TELL US YOUR TROUBLES

IT is our intention to make the "Answers to Correspondents" section of the paper a guide, philosopher and friend to anyone in trouble over his or her hobby. Provided intelligent questions are asked, the answers, we know, are of deep interest not only to the inquirer, but to anyone else who happens to be interested in the subject dealt with. It has been our experience with "Wireless Weekly" that the Queries pages have been among the most widely read of all. In RADIO AND HOBBIES we will have a much better scope to deal with troubles of all kinds, which we will iron out to the best of our ability.

Keep your questions, if possible, to subjects of general interest.

Don't write and ask us things such as, "What is Radio?"

Make your questions brief and to the point; we will make our answers the same.

We will try to answer every query received in reasonable time in the first available issue.

Our address is RADIO AND HOBBIES IN AUSTRALIA, Box 3366PP, G.P.O., Sydney.

A.A. (Auburn) asks a number of questions.

A.—Transformer coupling will give greater volume than resistance coupling, because it provides a step-up in voltage through the ratio of its windings, whereas there is no step-up in the resistance coupling network. The valve provides the gain. It is O.K. to connect the aerial to the reaction coil through a small coupling condenser of about .0001 mfds. The whistle in your superhet. may be due to many causes—is the aerial too large? Maybe the intermediate frequency is incorrect. High "Q" is a term applied to anything in which all the electrical characteristics are found in favorable quantities. For instance, a coil which had high inductance, low self-capacity, good insulation, &c., would also have a high Q. Low losses usually mean high Q, and high losses low Q.

W.B. (Sydney) wants a single val set for local stations.

A.—What's wrong with Little Jim Mate, described in this issue? It appea to be just the thing you require. Y don't say whether battery operation required or not, but if you have A.C then the original Little Jim, as de cribed in last issue of RADIO AN HOBBIES would be more suitable. V doubt, however, whether you could bu it complete for 30/-, unless you we able to pick up some very cheap part

R.J. (East Camberwell) wants deta of the Duplex Single.

A.—We have no details available f this set other than those contained the Call Sign Book to which you refe We have a few of these books left, hov ever, and you can get one for 1/- stamps post free from our office, if y cannot get one elsewhere. The iss containing the original description out of print.

"Troubled" (Wentworthville) has 1933 Advance, which has begun to pl tricks, and tends to stop altogether, at least on the bottom of the ban almost as it likes.

A.—With superhets using autodyn circuits this is not an uncommon fau As a rule, it is worse in the dam weather. If you can get the set goi well again after gently warming it wi a heater, so that everything, includi coils, are thoroughly dry, you can put down to the high humidity which seen to be a frequent cause. It would be good idea to use an Isolantite padder yours is the old fabric type, but oft only a new coil kit, properly impre nated, will get the set going again. Als you could try a 5000 ohms resistor a a .001 condenser in the cathode circu of the autodyne.

B.S. (via Lismore) writes of h pleasure in hearing good speaker rece tion from his Duplex Single, on only small B battery.

A.—That's grand—it certainly prov itself to be a good set. Glad you ha done so well with it.

A.A.C. (Mt. Isa) asks about runni the Stereoscopic Six from a vibrator.

A.—No, we don't really advise it. We like to try it out first, but even with 240 volt type it's hard to say wheth you would have success or not. In yo case, you would probably do better build yourself a good 19 type of ampl fier, and be satisfied with a couple watts, which you could get from it. A ordinary standard vibrator would pro ably suit such an amplifier.

Printed and Published by Associated Newspapers Ltd., at the registered office of the Company, 60-66 Elizabeth-street, Sydney, for the Proprietors of "Wireless Weekly."